It All Adds Up: Extending Mathematics from School to Home to Increase Student Success

An Honors Thesis (Honrs 499)

by

Amy L. Ksander

Miss Nancy Kitt

Nancy A. Kitt

Ball State University
Muncie, IN

April 2002

May 2002

Acknowledgments

Though my name is on this work, there would not have been a project if there weren't many people supporting and helping me through the process. I would like to thank my thesis advisor, Miss Nancy Kitt, for her willingness to help me undertake this project. Her support, guidance, friendship, and time spent at the "thinking table" over the past two years are much appreciated. Without her help, I couldn't have made the connections with all of the schools that are now participating in my project, and the project simply wouldn't have been possible. I appreciate my mother's help in editing and making sure everything was in perfect condition, and her hours of assistance in compiling evaluation data. Thanks are also due to my family for their love and support that allowed me to get to this point in my career. I am grateful to Josh for his help in sorting out my layout and for his assistance in getting my things together and staying calm and focused throughout the experience, especially on the day of ICTM. Thanks to Rodney for the magic dust to help me through the nerves during my presentation. I would like to extend my thanks to the principals of all 12 schools participating in my project, for putting their faith in me and in the quality of my project. Finally, a big thank you goes out to the 4,838 students and their parents. The hundreds of hours spent every week working with your child on these activities shows a great dedication to education. Without families committed to education, there would have been no place for this project. I sincerely appreciate that commitment and dedication, as well as the assistance with my project. Thank you all.

Abstract

Many parents have trouble when trying to help their children with homework because so much has changed in education since these parents were in school. In fact, in the year 2000, the state of Indiana came out with a new set of educational and instructional standards for mathematics, entitled Indiana's Academic Standards. I feel that some parents want to be involved in their child's education, but sometimes they do not have the proper information to be able to do so. Often, parents just are not aware of where to start or what to do with their child. They are not aware of what is expected or required of their child at a particular grade level, or they are not familiar with current strategies or manipulatives used in mathematics education.

With falling achievement test scores and an ever more advanced society, mathematics skills are more valuable today than ever. In order for students to get the most out of their educational experiences, I believe that involvement of the child's first and most important teacher(s), the parent(s), is crucial.

In order to facilitate this parental involvement, I produced a year long series of monthly newsletters to provide parents with information about Indiana's Academic Standards 2000 for Mathematics, activities they can do with their child at home, books that can be read as a family to reinforce mathematics concepts, and directions for manipulatives that can be used as a scaffold for mathematic skill development. A compiled parent assessment of the project and a personal reflection on the experience are also included.

Table of Contents

Table of Contents

September 2001, Issue 1 (K-6)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Dear Parent,

My name is Amy Ksander and I am an Honors College senior majoring in Elementary Education at Ball State University. As a part of the curriculum for the Honors College, each student completes a thesis project. The newsletter you are currently reading is the beginning of my senior honors thesis project.

It is my belief that the teaching of mathematics has changed a lot, even since I was in elementary school. I remember how it was always hard for my parents to help me with my math homework, because I felt that they did not know what we were doing in school. I can imagine how much of a challenge it is for a parent today to help their child with math at home. This is the point where my project comes in. Working with Ball State mathematics professor Nancy Kitt, I have come up with eight monthly issues of a newsletter (including this introductory issue) that I hope will help you as a parent to further understand the things your child should know and be able to do in the area of mathematics at his or her grade level. Each issue will give you some information about Indiana's Academic Standards for Mathematics (the new guidelines for what a child should know and be able to do), directions for some homemade math manipulatives (hands-on tools for teaching math), and directions for some activities you can do with your child using those manipulatives. A later issue will include an evaluation form for you to return to me telling me about your experiences with this project.

It is my firm belief that involvement in the home significantly increases a child's success at school. It is my hope that you will be able to spend some time with your child and use the activities and information to help increase your child's success in mathematics.

Best wishes in this new school year!

Amy Ksander

October 2001, Issue 2 (K-1)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

MAKING SENSE OUT OF NUMBERS

Happy Halloween! This month may sometimes be associated with ghosts and goblins, but this month's math focus is on **number sense**. Number sense for kindergarten children means that children understand written numbers from 0 to 10, that those numbers represent a group of objects, and that the number doesn't change if the objects are rearranged. First grade children should understand symbols, objects, and pictures used to represent numbers up to 100. If you feel overwhelmed by this information, just wait until you see the section entitled "**What to Expect from your Child.**" This section will give more specific information about what the State of Indiana says your child should be able to do by the end of the school year. To help your child reach these goals, use the following activities and work with your child for 10 to 15 minutes a day or a few times a week. If one of the activities seems too hard or too easy for your child or it just isn't interesting, try another one. **Don't expect your child to be able to do everything right away!** Remember the expectations are for the end of the school year and this is only October!

Still Inside...

[redacted]

in terms of **NUMBER SENSE**

Kindergarten

Your child should be able to:

- Match sets of objects one-to-one. Example: Give one cookie to each member of your family.
- Compare groups of objects and tell if one group is equal to, more than, or less than the other.
- Know that a group with a larger number contains more objects than a group with a smaller number.
- Divide groups of 10 or fewer objects into equal parts.
- Divide shapes into equal parts.
- Count, recognize, represent, name, and order a group of up to ten objects.
- Find the number that is one more or one less than any number (0 to 10).
- Use correctly the words one, many, none, some, all, more, less, most, and least.
- Record and organize information using objects and pictures.

First Grade

Your child should be able to:

- Count, read, and write whole numbers up to 100.
- Count and group objects in ones and tens.
- Identify the number of tens and ones in numbers less than 100.
- Compare whole numbers and arrange them in numerical order.
- Match the names first, second, third, etc. with an ordered set of up to 10.
- Recognize when a shape is divided into two parts of equal size.
- With a shape divided into 8 or fewer parts, describe a shaded portion as "___ out of ___ parts" and write the fraction.
- With a group of 8 or fewer objects, describe a part of the group as "___ out of ___ parts" and write the fraction.
- Represent, compare, and interpret data using picture graphs.

October 2001-Issue 2 (K-1)

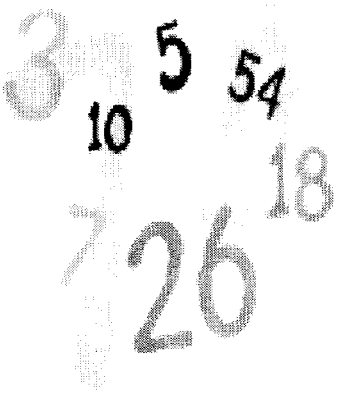
Great Math Activities

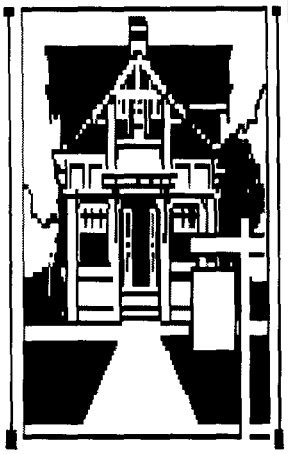
Yummy in my Tummy Numbers

You will need:

- pudding
- clean placemat or plate

Have your child use the pudding as finger paint. Practice making the different numbers 0 through 10. PLAY ALONG WITH YOUR CHILD! It is very important that he or she sees the correct way to make the numbers. When you're finished with this activity, the left over pudding and the pudding on your fingers makes a very yummy snack!





The Counting House

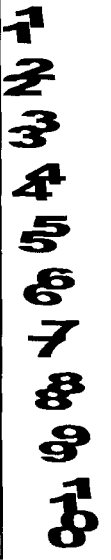
It is easy to find literature to help your child learn more about number sense, especially when he or she is in the early grades. Go to a local library and check out Anno's Counting House by Mitsumasa Anno. This is a book with the story told only in pictures. There are no words! You and your child can make up the story based on the pictures. After you have gone through the story a few times, have your child draw pictures of two houses, one on each of two sheets of paper. Then draw and cut out pictures of ten children. As you read the story again, have your child move the children from one house to the other as they do in the book. Try some of the author's suggestions at the beginning of the book! If you find this easy, try writing the different combinations for ten-- one plus nine, two plus eight, etc.

How many can you hold?

You will need:

- Cheerios (or other cereal with same sized pieces)
- paper and pencil

Have your child hold out both hands and fill them with the cereal. Each of you should estimate (make a good guess) how many pieces are in your child's hands. Write down these estimates. How did you make your estimate? Now count by placing the cereal into two equal groups. Count one of the groups into piles of ten. Then count the groups of ten and the leftovers. Is your estimate still reasonable? If not, make a new one and write it down. Discuss with your child why each of you made those new estimates (or didn't make new estimates). Now count all of the cereal pieces and see which estimate came closer. Now that you know how to estimate, try and play again and see if you can get closer!



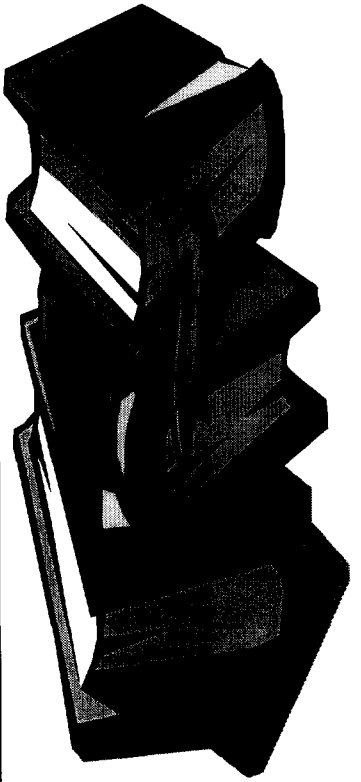
October 2001-Issue 2 (K-1)

Great Math Activities

Story Time

Reading to your child is EXTREMELY important! Read often! The next time you visit a local library, check out and read some of these great number stories:

- Anno's Counting Book by Mitsumasa Anno
- Ten in a Bed by Mary Rees
- How Much is a Million? by David Schwartz
- The Doorbell Rang by Pat Hutchins
- Fish Eyes by Lois Ehlert
- Alexander, Who Used to be Rich Last Sunday by Judith Viorst
- Mouse Count by Ellen Stoll Walsh
- Ocean Parade by Patricia MacCarthy
- Zin! Zin! Zin! A Violin by Lloyd Moss and Marjorie Priceman
- Waving: A Counting Book by Peter Sis
- Feast for Ten by Cathryn Falwell
- 1, 2, 3, to the Zoo by Eric Carle
- One Red Rooster by Kathleen Sullivan Carroll and Suzette Barbier



Bean Sticks

Bean Sticks

You will need:

- lima beans or other small objects
- tongue depressors
- glue

Make bean sticks with your child. Have him or her count out dried lima beans. Then glue ten onto each tongue depressor. When you get 10 sticks finished, glue the sticks together. Keep some as single sticks and some as single units. These are a great way to do activities at home with your student without having to have expensive base ten blocks. **In addition,** counting out the objects and putting them into groups is a good activity for young children. These activities help the child to learn the correspondence between numbers.

Grab a selection of beans and bean sticks and practice counting them with your child. Even this simple activity will help reinforce the number concepts being taught at school.

Activities and information for this issue came from:

- Curriculinks Grades K-2 by K. Saxe
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics
- Children's Literature in the Elementary School 6th Edition by C.S. Huck, S. Helper, J. Hickman, and B.Z. Kiefer

October 2001-Issue 2 (K-1)

October 2001, Issue 2 (2-3)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

MAKING SENSE OUT OF NUMBERS

Happy Halloween! This month may sometimes be associated with ghosts and goblins, but this month's math focus is on **number sense**. Number sense for second grade children means understanding numbers up to 100 in terms of place value, written numbers, and quantities. Second grade children should also understand that fractions refer to parts of a group or a whole. Third grade expectations are much the same, but these children should understand numbers up to 1,000. Third grade children should also understand the relationship between whole numbers, simple fractions, and decimal numbers. If you feel overwhelmed by this information, just wait until you see the section entitled "**What to Expect from your Child.**" This section will give more specific information about what the State of Indiana says your child should be able to do by the end of the school year. To help your child reach these goals, use the following activities and work with your child for 15 to 20 minutes a day or a few times a week. If one of the activities seems too hard or too easy for your child or it just isn't interesting, try another one. **Don't expect your child to be able to do everything right away!** Remember the expectations are for the end of the school year and this is only October!

Still Inside...

[redacted]

in terms of NUMBER SENSE

Second Grade

Your child should be able to:

- Count by ones, twos, fives, and tens to 100.
- Identify the pattern of numbers in each group of tens, tens through nineties.
- Identify numbers up to 100 in various combinations of tens and ones.
- Name the number that is ten more or ten less than any number 10 through 90.
- Compare whole numbers up to 100 and arrange them in numerical order.
- Match the number names first, second, third, etc. with an ordered set of up to 100 items.
- Identify odd and even numbers up to 100.
- Recognize fractions as part of a whole or parts of a group (up to 12 pieces).
- Recognize, name, and compare the unit fractions: $\frac{1}{2}$, 1/3, $\frac{1}{4}$, 1/5, 1/6, 1/7, 1/8, 1/10, and 1/12.
- Know that when all fractional parts are included, the result is equal to the whole and to one.
- Record numerical data in systematic ways.
- Represent, compare, and interpret data using tally charts and bar graphs.

Third Grade

Your child should be able to:

- Count, read, and write whole numbers up to 1,000.
- Identify and interpret place value in whole numbers up to 1,000.
- Use words, models, and expanded forms to represent numbers up to 1,000.
- Identify any number up to 1,000 in various combinations of hundreds, tens, and ones.
- Compare whole numbers up to 1,000 and arrange them in numerical order.
- Round numbers less than 1,000 to the nearest ten and nearest hundred.
- Identify even and odd numbers up to 1,000.
- Show equivalent fractions using equal parts.
- Identify and use correct names for numerators and denominators.
- Given a pair of fractions, decide which is larger or smaller by using objects or pictures.
- Given a set of objects or a picture, name and write a decimal to represent tenths and hundredths.
- Given a decimal for tenths, show it as a fraction using a place value-model.
- Interpret circle graphs.

October 2001-Issue 2 (2-3)

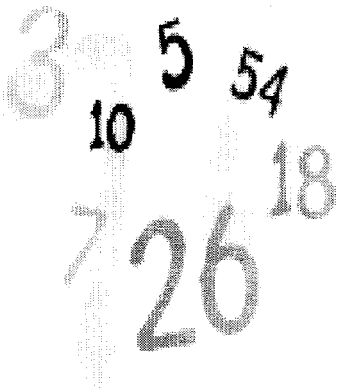
Great Math Activities

Guess and Group

You will need:

- a container of beans, buttons, or other small objects
- pencil and paper

Take a handful of objects and before you look at the handful, guess how many objects you are holding. Record your guess. Count your objects and compare them to your guess. Repeat this activity as desired. For variety, practice counting by 2's, 3's, 4's, 5's, 6's, 7's, 8's, 9's, or 10's.



The Counting House

It is easy to find literature to help your child learn more about number sense, especially when he or she is in the early elementary grades. Go to a local library and check out Anno's Counting House by Mitsumasa Anno. This is a book with the story told only in pictures. There are no words! You and your child can make up the story based on the pictures. Try some of the author's suggestions at the beginning of the book! Maybe try acting the story out using stuffed animals. If you find this easy, try writing the different combinations for ten- - one plus nine, two plus eight, etc.

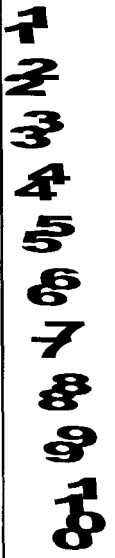
Try more number sense books, listed on the following page.

Fraction Kits

You will need:

- pencil
- scissors
- 5 different colors of construction paper (you will need strips that are 3 inches by 18 inches)

Take 5 strips of different colors. Have your child make sure that each of the strips is the same length as the others. Each of these strips represents ONE WHOLE. Some of the strips will be cut into smaller pieces to represent fractions. Label one strip ONE WHOLE. Now take another strip and carefully fold it in half. You will have 2 sections when you open this up. Each of these represents one-half. Label the sections and then cut on the fold. Repeat this process. Fold in half twice to create ¼ pieces. Fold in half three times to create 1/8 pieces. Fold in half 4 times to create 1/16 pieces. You and your child can try to create other fractions with new strips of construction paper. Also, practice counting the number of fractional pieces that make up ONE WHOLE. For example, 8 of the 1/8 pieces will fit into the ONE WHOLE.



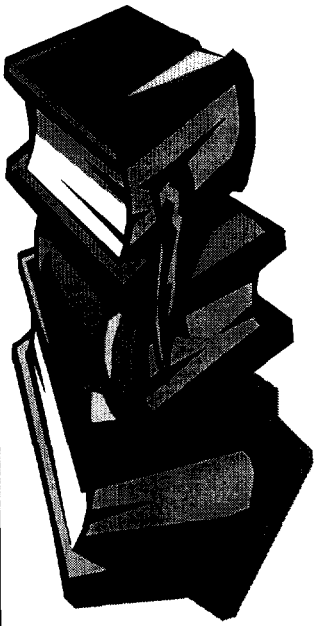
October 2001-Issue 2 (2-3)

Great Math Activities

Story Time

Reading to your child is EXTREMELY important! Read often! The next time you visit a local library, check out and read some of these great number stories:

- Anno's Counting House by Mitsumasa Anno
- Animal Numbers by Bert Kitchen
- How Much is a Million? by David Schwartz
- One White Snail by S.T. Garne and Lisa Etre
- Fish Eyes by Lois Ehlert
- Eating Fractions by Bruce McMillan
- 12 Ways to Get to 11 by Eve Merriam and Bernie Karlin
- Ocean Parade by Patricia MacCarthy
- Zin! Zin! Zin! A Violin by Lloyd Moss and Marjorie Priceman
- Waving: A Counting Book by Peter Sis
- Feast for Ten by Cathryn Falwell
- How Many Snails? by Paul Giganti, Jr. and Donald Crews
- Splash by Ann Jonas



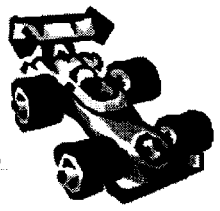
Bean Sticks

Bean Sticks

You will need:

- lima beans or other small objects
- tongue depressors
- glue

Make bean sticks with your child. Have him or her count out dried lima beans. Then glue ten onto each tongue depressor. When you get 10 sticks finished, glue the sticks together. Make several flats of 10 sticks; keep some as single sticks of ten beans and some beans as single units.

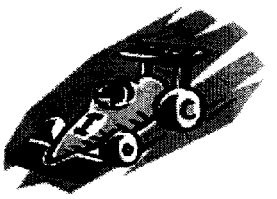


Race to a Flat

With two to five players, a set of bean sticks, and a pair of dice, take turns rolling the dice and taking that many beans. (Example: if you roll a 4 and a 5, you would get 9 beans) Each time you are able, make a trade (10 beans for 1 stick or 10 sticks for a flat). When all trading is complete, it is the next player's turn to do the same. The first player to be able to trade up to a flat wins.

Give Away a Flat

This game is the same as race to a flat, but instead of starting with nothing and taking units, each player starts with a flat and gives away the amount of beans that he or she rolls on the dice. The first player to trade down and give away all of his or her units is the winner.



Activities and information for this issue came from:

- Curriculinks Grades K-2 by Kim Saxe and Curriculinks Grades 3-4 by Ann Roper
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics

October 2001-Issue 2 (2-3)

October 2001, Issue 2 (4-6)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

MAKING SENSE OUT OF NUMBERS

Happy Halloween! This month may sometimes be associated with ghosts and goblins, but this month's math focus is on **number sense**. Number sense for fourth graders means understanding whole numbers (1,2,3...) and decimals to two decimal places, and the relationship of decimals and fractions. Fifth grade students should be able to perform calculations with whole numbers, decimals, and fractions. They should understand the relationships between decimals, fractions, and percents. Fifth graders should also understand prime and composite numbers. Sixth graders should compare and order positive and negative integers, decimals, fractions, and mixed numbers. They should also be able to find factors and multiples. If you feel overwhelmed by this information, just wait until you see the section entitled "**What to Expect from your Child.**" This section will give more specific information about what the State of Indiana says your child should be able to do by the end of the school year. To help your child reach these goals, use the following activities and work with your child for 15 to 20 minutes a day or a few times a week. If one of the activities seems too hard or too easy for your child or it just isn't interesting, try another one. **Don't expect your child to be able to do everything right away!** Remember the expectations are for the end of the school year and this is only October!

Still Inside...

[redacted] in terms of NUMBER SENSE

Fourth Grade

Your child should be able to:

- Read and write whole numbers up to 1,000,000.
- Identify and write whole numbers up to 1,000,000, given a place value model.
- Round whole numbers up to 10,000 to the nearest ten, hundred, and thousand.
- Order and compare whole numbers using the symbols for less than, greater than, and equal to.
- Rename and rewrite whole numbers as fractions.
- Name and write mixed numbers, using objects or pictures.
- Name and write mixed numbers as improper fractions, using objects or pictures.
- Write tenths and hundredths in decimal and fraction notation. Know the fraction and decimal equivalents for halves and fourths.
- Round two-place decimals to one place or to the nearest whole number.

Fifth Grade

Your child should be able to:

- Convert between numbers in words and numbers in figures, for numbers up to millions and decimals to thousandths.
- Round whole numbers and decimals to any place value.
- Arrange in numerical order and compare decimal places by using the symbols for less than, equal to, and greater than.
- Interpret percents as a part of a hundred. Find the decimal and percent equivalents for common fractions and explain why they represent the same value.
- Explain different interpretations of fractions: as parts of a whole, parts of a set, and division of whole numbers by whole numbers.
- Identify numbers as prime or composite numbers.
- Identify on a number line the relative position of simple positive fractions, positive mixed numbers, and positive decimals.

Sixth Grade

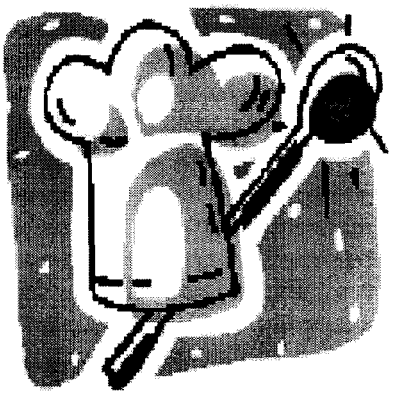
Your child should be able to:

- Understand and apply the basic concept of negative numbers.
- Interpret the absolute value as the distance from zero on a number line, and find the absolute value of real numbers.
- Compare and represent on a number line: positive and negative integers, fractions, decimals (to hundredths), and mixed numbers.
- Convert between any two of these representations of numbers: fractions, decimals, and percents, without the use of a calculator.
- Recognize decimal equivalents of commonly used fractions without the use of a calculator.
- Use models to represent ratios and proportions.
- Find the least common multiple and the greatest common factor of whole numbers. Use them to solve problems with fractions.

October 2001-Issue 2 (4-6)

Great Math Activities

Math goes to the Kitchen



You may not think about it, but most of the time the work you do in the kitchen uses math skills. Many times kids will look at fractions and say, "When will we ever use this stuff?" Cooking is one of the best real life examples of using fractions that you can show to a child, and you can do it right in your own home. All you need to do is pick a recipe, maybe for cookies or another item your child will enjoy. Make sure that the recipe contains some fractions. You can talk to your child about how the recipe may call for ½ cup of sugar and ½ tablespoon of salt and those are NOT the same amount. For an extra challenge, you can try making the recipe in a different proportion. Try making only a half or a third. Maybe try doubling a recipe. Then, enjoy the treat that math helped you create in your own kitchen.

Pay the Price

You will need:

- pencil
- paper
- newspaper ads or catalogs

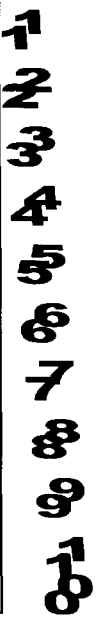
Set a pretend spending limit for your child, perhaps $100, or more if you wish. Then, have your child look through catalogs and/or newspaper ads to find things that they would like to buy. Have your child add up the prices and then figure out how much the sales tax would be. You could also pretend that the items went on sale. How much would you save if items were 25% off? 50%? 75%? As an extension, try comparison-shopping. Look for the same item at different stores, or different brands within the same store. How can you get the most for your money?

Fraction Kits

You will need:

- pencil
- scissors
- 5 different colors of construction paper (you will need strips that are 3 inches by 18 inches)

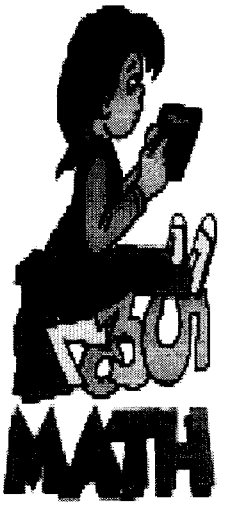
Take 5 strips of different colors. Have your child make sure that each of the strips is the same length as the others. Each of these strips represents ONE WHOLE. Some of the strips will be cut into smaller pieces to represent fractions. Label one strip ONE WHOLE. Now take another strip and carefully fold it in half. You will have 2 sections when you open this up. Each of these represents one-half. Label the sections and then cut on the fold. Repeat this process. Fold in half twice to create ¼ pieces. Fold in half three times to create 1/8 pieces. Fold in half 4 times to create 1/16 pieces. You and your child can try to create other fractions with new strips of construction paper. Also, practice counting the number of fractional pieces that make up ONE WHOLE. For example, 8 of the 1/8 pieces will fit into the ONE WHOLE.



October 2001-Issue 2 (4-6)

Great Math Activities

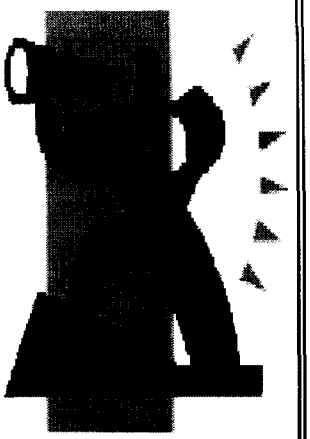
Judy's Fractions



You will need:

- Fraction kits (see previous pages)
- pennies
- 3 or more players

Each player begins with the equivalent of 6 wholes, using any of the fraction pieces. At the beginning of each round, each player puts some set of fraction pieces, for example 2 ¼, into the pot, betting that the lead player will toss heads or tails. Then the player tosses the coin. The pot is then divided evenly among the winners. You may have to trade larger fraction pieces for an equivalent amount of smaller pieces in order to divide evenly. Leftover pieces are left in the pot for the next round. The player to the left of the lead player becomes the lead player for the next round. You may choose to play a specific number of rounds or for a set amount of time.



Fraction Scavenger Hunt

You will need:

- pencil
- paper
- sharp eyes!

I can remember back to my school days and I remember how we always used to ask the teacher "When will we ever use that?" Challenge your child to look for ways that we use fractions or decimals in every day life. Put a piece of paper on your refrigerator or some other spot for a week. Each time you or your child sees fractions in use, have him or her record where the fraction was found. I bet that by the end of the week, you will have a list that shows your child exactly how fractions are used in daily life!

Some ideas: music (eighth note, quarter note, etc.), money, cooking, measuring, radio station frequencies.... what others can you find?

Fractional Advertising

You will need:

- a couple of magazines that include ads
- pencil

Have your child look through a magazine, focusing on the advertising. What different sizes of ads are there? List all of the different fractions of one page covered by ads in your magazine. For example, there might be ½, 1/3, and ¾. Put the list of those fractions in order from smallest to largest. How much of the space in the magazine do you think is filled with ads? Which magazine has the most ads? Which has the fewest? Why do you think that might be? Make up a price for each ad size. How much money would you make selling that ad space for your magazine?

Activities and information for this issue came from:

- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics
- Curriculinks Grades 3-4 by Ann Roper and Curriculinks Grades 5-6 by Christy Fong

October 2001-Issue 2 (4-6)

November 2001, Issue 3 (K-1)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

MAKING NUMBERS COMPUTE

I remember that math always seemed like this far-out concept and the only real math in my life were the problems that I had to copy out of my math book and answer on a separate sheet of paper. Now that I've grown up just a little bit, I think that the really neat part about mathematics is that it is truly all around us. Math can be found everywhere, especially outside of the classroom, the math book, and math homework. Computation is perhaps thought of as one of the duller math topics, because it is generally associated with memorizing basic facts. BUT THAT'S NOT ALL THERE IS TO COMPUTATION! I hope that this month you will see that computation can be found in the most common places, and that math really isn't as bad as you might remember it being in your school days. It is recommended that you **focus on your child's understanding of the concepts of addition and subtraction, not on their memorization of the facts**. So, for the topic of **computation**, kindergarten students focus on understanding and describing simple addition and subtraction. First grade students move beyond the simple understanding and are expected to demonstrate the meaning of addition and subtraction and to use the operations to solve problems.

Still Inside...

[redacted] in terms of **COMPUTATION**

Kindergarten

Your child should be able to:

- Model joining sets of objects (which total no more than ten when combined). For example, put two race cars with four race cars. Count the total number of race cars.
- Model subtraction by removing objects from sets (for numbers less than ten). For example, from a pile of 9 cheerios, take away 3 cheerios. Count the number of cheerios left in the pile.
- Describe addition and subtraction situations (for numbers less than 10). For example, when you took the cheerios away, explain what operation you were using.

First Grade

Your child should be able to:

- Show the meaning of addition (putting together or increasing) using objects.
- Show the meaning of subtraction (taking away, comparing, finding the difference) using objects.
- Show equivalent forms of the same number (up to 20) using objects, diagrams, and numbers. 15 is the same as 8+7, 5+5+5, 15+0, 20-5, etc.
- Demonstrate the mastery of addition facts (for totals up to 20) and the corresponding subtraction facts.
- Understand the meaning of the symbols + (plus), - (minus), = (equals).
- Understand the role of zero in addition and subtraction. For example, how many eggs will you have if you start with 6 eggs and give away 0 eggs?
- Understand and use the inverse relationship between addition and subtraction facts, such as 4 + 2 = 6 and 6 - 2 = 4, etc. to solve simple problems.

November 2001-Issue 3 (K-1)

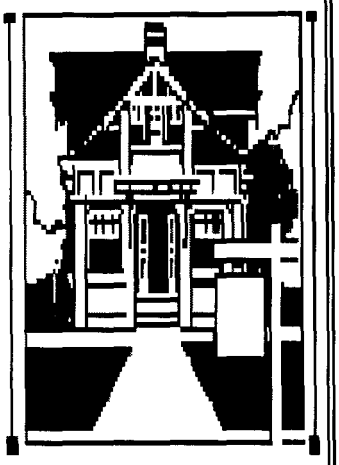
Great Math Activities

Number Families

You will need:

- pudding
- paper
- Annie's One to Ten by Annie Owen

Read the story Annie's One to Ten. Use the pudding as finger paint and create your own sets of number families, like Annie's family of 10s. For example, 10=1+9 and 10=2+8. See how many different combinations you can list for all the numbers one through ten. When you're finished with this activity, the left over pudding and the pudding on your fingers makes a very yummy snack!



Make Up a Math Story

Try to make up a story problem using a specific number sentence, for example, 2+3=5. A sample story could be "*I had 2 cookies in my lunch. When I got to school, I got 3 more cookies from my teacher because I knew how to solve the daily math problem. When I went to lunch, I counted my cookies. How many did I have?*" I am sure that you and your child can come up with many great stories. Try to be creative and use addition and subtraction facts. Once you get good at making up the stories, try drawing pictures to illustrate the stories. Then add the number sentence you were using at the bottom. Keep these pictures and look at them with your child often over the next few weeks. These will help your child to learn and understand these math facts.

Just the Facts!

You will need:

- CREATIVITY
- PATIENCE

Learning the basic math facts is important. Here are some suggestions for helping your child to learn the facts.

- Practice with just one fact per day. Repeat the fact with your child many times during the day. Say it, write it, draw it, act it out. Anything that will help it stick in your child's memory.
- Use creativity to repeat the "fact of the day". Use singing, shouting, whispering, deep voices, high voices, maybe even an animal voice. BE CREATIVE! This can make the repetition fun for children.
- Help your child to see that the facts are related. For example, 4+2=6, 2+4=6, 6-4=2, 6-2=4. This cuts down on the number of facts a child has to learn.

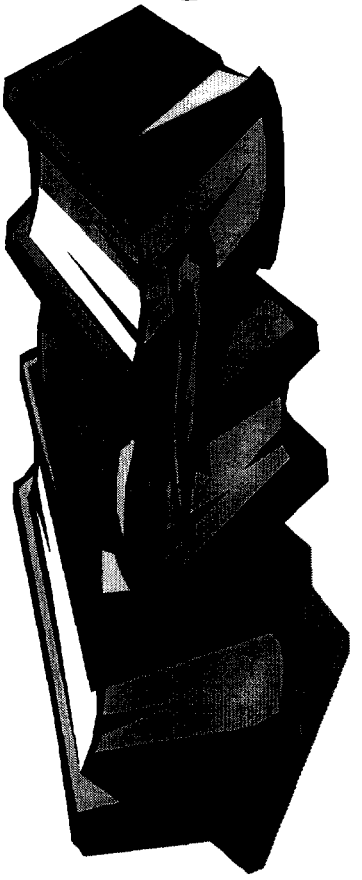
November 2001-Issue 3 (K-1)

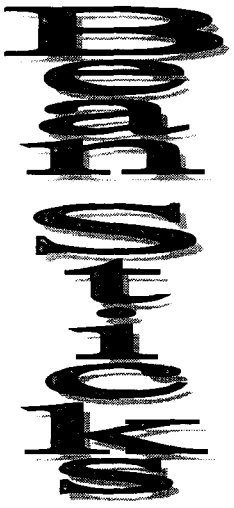
Great Math Activities

Story Time

Reading to your child is EXTREMELY important! Read often! The next time you visit a local library, check out and read some of these great number stories:

- Counting Wildflowers by Bruce McMillan
- So Many Cats by Beatrice Schenk de Regniers
- How Much is a Million? by David Schwartz
- The Doorbell Rang by Pat Hutchins
- Annie's One to Ten by Annie Owen
- Alexander, Who Used to be Rich Last Sunday by Judith Viorst
- Mouse Count by Ellen Stoll Walsh
- The Great Take-Away by Louise Mathews
- Penelope Gets Wheels by Esther Allen Peterson
- Bunches and Bunches of Bunnies by Louise Mathews
- The Family Minus by Fernando Krahn
- The Very Hungry Caterpillar by Eric Carle
- Addition Annie by David Gisler
- Too Many Hopkins by Tomie dePaola





One bean, Two bean

You will need:

- bean sticks (directions for bean sticks were included in the October issue)
- paper and pencil

Begin by reviewing counting. Grab a selection of beans and bean sticks and practice counting them with your child. Then take a few beans in one hand and a few beans in the other hand and have your child count the two groups. Then combine the beans into one pile and count them. After doing this a few times, draw a picture of the beans you have in your hands and then the two piles all together. Next, write the number sentence (4 beans + 5 beans = 9 beans) for the equation after you use the beans and draw the picture.

Activities and information for this issue came from:

- Math Through Children's Literature by K.L. Braddon, N.J. Hall, and D. Taylor
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics
- Elementary and Middle School Mathematics by J.A. Van de Walle

November 2001-Issue 3 (K-1)

November 2001, Issue 3 (2-3)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

MAKING NUMBERS COMPUTE

I remember that math always seemed like this far-out concept and the only real math in my life were the problems that I had to copy out of my math book and answer on a separate sheet of paper. Now that I've grown up just a little bit, I think that the really neat part about mathematics is that it is truly all around us. Math can be found everywhere, especially outside of the classroom, the math book, and math homework. Computation is perhaps thought of as one of the duller math topics, because it is generally associated with memorizing basic facts. BUT THAT'S NOT ALL THERE IS TO COMPUTATION! I hope that this month you will see that computation can be found in the most common places, and that math really isn't as bad as you might remember it being in your school days. It is recommended that you **focus on your child's understanding of the concepts of addition, subtraction, multiplication, and division, not on their memorization of the facts**. So, for the topic of **computation**, second grade students focus on simple addition and subtraction problems involving numbers up to 100. Third grade students solve more complex addition and subtraction problems, as well as modeling and solving simple multiplication and division problems. You can involve your child in tasks as simple as balancing a checkbook to show how math is used in every day life!

Still Inside...

[redacted]
in terms of **COMPUTATION**

Second Grade

Your child should be able to:

- Model addition of numbers less than 100 with objects and pictures.
- Add two whole numbers less than 100 with and without regrouping.
- Subtract two whole numbers less than 100 without regrouping.
- Understand the relationship between addition and subtraction. For example, 89-17=72 and 72+17=89.
- Use estimation to decide if answers are reasonable in addition problems.
- Use mental math to add or subtract 0, 1, 2, 3, 4, 5, or 10 with numbers less than 100.

Third Grade

Your child should be able to:

- Add and subtract whole numbers up to 1,000 with or without regrouping, explaining method.
- Represent the concept of multiplication as repeated addition.
- Represent the concept of division as repeated subtraction, equal sharing, and forming equal groups.
- Know and use the relationship between multiplication and division facts. For example, 7 x 6 =42, 6 x 7=42, 42 / 7 =6, 42 / 6 = 7.
- Show mastery of multiplication facts for 2, 5, and 10.
- Add and subtract simple fractions with the same denominator.
- Use estimation to decide whether answers are reasonable in addition and subtraction problems.
- Use mental math to add or subtract with numbers less than 100.

November 2001-Issue 3 (2-3)

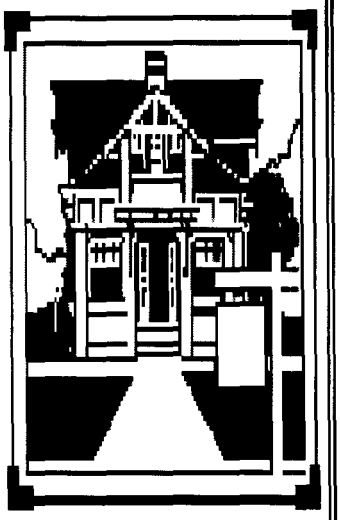
Great Math Activities

Number Families

You will need:

- pudding or something to write with
- paper

Did you know that numbers have families too? Think of all the ways that you can use addition, subtraction, multiplication, and division to make numbers up to 100. Use the pudding as finger paint and create your own sets of number families. For example, 10=1+9 and 10=2+8. See how many different combinations you can list for numbers one through one hundred! When you're finished with this activity, the left over pudding and the pudding on your fingers makes a very yummy snack!



Make Up a Math Story

Try to make up a story problem using a specific number sentence, for example, 2+3=5. A possible story might be "*I had 2 cookies in my lunch. When I got to school, I got 3 more cookies from my teacher because I knew how to solve the daily math problem. When I went to lunch, I counted my cookies. How many did I have?*" I am sure that you and your child can come up with many great stories. Try to be creative and use addition and subtraction facts (also multiplication and division facts for 3rd grade). Once you get good at making up the stories, try drawing pictures to illustrate the stories. Then add the number sentence you were using at the bottom. Keep these pictures and look at them with your child often over the next few weeks. These will help your child to learn and understand these math facts.

Just the Facts!

You will need:

- CREATIVITY
- PATIENCE

Learning the basic math facts is important. Here are some suggestions for helping your child to learn the facts.

- Practice with **just one fact** per day. Repeat the fact with your child many times during the day. Say it, write it, draw it, act it out. Anything that will help it stick in your child's memory.
- Use creativity to repeat the "fact of the day". Use singing, shouting, whispering, deep voices, high voices, maybe an animal voice. BE CREATIVE! This can make the repetition fun for children.
- Help your child to see that the facts are related. For example, 4+2=6, 2+4=6, 6-4=2, 6-2=4. This cuts down on the number of facts a child has to learn.

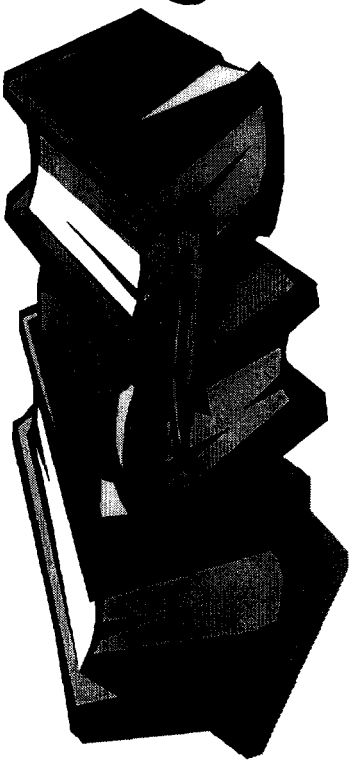
November 2001-Issue 3 (2-3)

Great Math Activities

Story Time

Reading to your child is EXTREMELY important! Read often! The next time you visit a local library, check out and read some of these great number stories:

- Counting Wildflowers by Bruce McMillan
- So Many Cats by Beatrice Schenk de Regniers
- How Much is a Million? by David Schwartz
- The Doorbell Rang by Pat Hutchins
- Annie's One to Ten by Annie Owen
- Alexander, Who Used to be Rich Last Sunday by Judith Viorst
- A Job for Jenny Archer by Ellen Conford
- The Great Take-Away by Louise Mathews
- Penelope Gets Wheels by Esther Allen Peterson
- Bunches and Bunches of Bunnies by Louise Mathews
- The Family Minus by Fernando Krahn
- Humphrey the Number Horse by Rodney Peppe
- Addition Annie by David Gisler
- Each Orange Had 8 Slices by Paul Giganti, Jr.



Game Time

How Close Can You Get?

You will need:

- a deck of cards (use only the ace and 2, 3, 4, 5, 6, 7, 8, and 9 cards) no 10s or face cards! (THE ACE BECOMES THE 1 CARD)
- paper and pencil
- 2 to 5 players

Deal 4 cards face down to each player. The dealer then turns up 2 cards. The first card is the tens digit, the second is the ones digit. This becomes the TARGET NUMBER. *For example, if I turned a 6 then an Ace, the target number would be 61.* Now players turn over their cards and try to arrange the digits to form 2 two-digit numbers. The idea is to be able to subtract the two numbers and get close to the target number. *In my example, if I had an Ace, 5, 3, and 9, I would arrange them to make 95-31, which equals 64. My score would be 3 because I was 3 away from the target number.* This is the end of the first round. Shuffle the deck and deal new cards and choose a new target number. Play for 5 rounds, each time recording the distance from the target number. At the end of 5 rounds, the player with the **lowest** total score wins!

Activities and information for this issue came from:

- Math Through Children's Literature by K.L. Braddon, N.J. Hall, and D. Taylor
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics
- Elementary and Middle School Mathematics by J.A. Van de Walle

November 2001-Issue 3 (2-3)

November 2001, Issue 3 (4-6)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

MAKING NUMBERS COMPUTE

I remember that math always seemed like this far-out concept and the only real math in my life were the problems that I had to copy out of my math book and answer on a separate sheet of paper. Now that I've grown up just a little bit, I think that the really neat part about mathematics is that it is truly all around us. Math can be found everywhere, especially outside of the classroom, the math book, and math homework. Computation is perhaps thought of as one of the duller math topics, because it is generally associated with memorizing basic facts. BUT THAT'S NOT ALL THERE IS TO COMPUTATION! I hope that this month you will see that computation can be found in the most every day places, and that math really isn't as bad as you might remember it being in your school days. It is recommended that you **focus on your child's understanding of the concepts of addition, subtraction, multiplication, and division, not on their memorization of the facts**. So, for the topic of **computation**, fourth grade students focus on understanding and using all four operations (add, subtract, multiply, and divide) with integers, as well as adding and subtracting fractions and decimals. Fifth grade students work more extensively with whole numbers, fractions, and decimals using all four operations. Sixth graders continue fifth grade work, but extend it by working on ratios, proportions, and percentages.

Still Inside...

[redacted] in terms of **COMPUTATION**

Fourth Grade

Your child should be able to:

- Understand and solve standard addition and subtraction problems. For example, 45,329+6,894=?
- Recognize and represent multiplication as repeated addition.
- Recognize and represent division as sharing objects or the groups of shared objects.
- Master multiplication tables for numbers 1 to 10 and master division facts for numbers 1 to 10.
- Multiply numbers up to 100 by numbers up to 10.
- Divide numbers up to 100 by numbers up to 10 (without remainders).
- Understand the special properties of 0 and 1 in multiplication and division.
- Add and subtract simple fractions with different denominators, using objects or pictures.
- Add and subtract decimals (to 2 decimal places), with and without using objects or pictures.
- Use estimation to decide if answers are reasonable in addition and subtraction.
- Use mental math to add or subtract rounded numbers.

Fifth Grade

Your child should be able to:

- Add and subtract fractions (including mixed numbers) with different denominators.
- Use models to show an understanding of multiplication and division facts.
- Multiply and divide fractions to solve problems.
- Add and subtract decimals and check the answer by estimating.
- Use estimation to decide if answers are reasonable in multiplication, division, addition, and subtraction problems.
- Use mental math to add or subtract simple decimals.

Sixth Grade

Your child should be able to:

- Add or subtract with positive or negative integers.
- Multiply and divide positive and negative integers.
- Multiply and divide decimals.
- Explain how to multiply and divide positive fractions and perform the calculations.
- Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation.
- Interpret and use ratios to show the relative sizes of two quantities. Use the notations: a/b, a to b, and a:b.
- Understand proportions and use them to solve problems.
- Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.
- Use estimation to decide if answers are reasonable in decimal problems.
- Use mental math to add or subtract simple fractions and decimals.

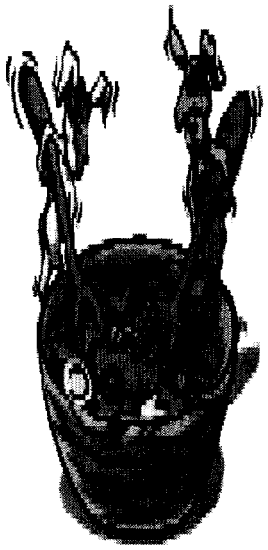
Great Math Activities

Three Bean Salads

You will need:

- 3 types of dried beans (red beans, lima beans, and black-eyed peas)
- plates or cups to hold small portions of beans

Find out how many of each of the three types of beans go into these salads. Use the beans to try to solve these problems. *(recipes below)* Guessing and checking is ok! All three types go into each salad. After the 8 recipes below are solved, make up your own salad! Write instructions for someone else to figure out your salad. Have your child do the same for you and then trade and try to figure out your new salads!



THREE BEAN RECIPES

1- Contains: 2 lima beans, twice as many red beans as lima beans, ten total beans

2- Contains: 4 red beans, $\frac{1}{2}$ as many black-eyed peas as red beans, ten beans in all

3- Contains: $\frac{1}{2}$ of the salad is lima beans, exactly 2 red beans, the number of lima beans is double the number of red beans

4- Contains: The same number of red beans as lima beans, 3 more black-eyed peas than red beans, a total of 18 beans

5- Contains: 12 total beans, $\frac{1}{2}$ are red, lima beans make up $\frac{1}{4}$

6- Contains: at least 12 beans, one more lima than it does red beans, one more red bean than it does black eyes

7- Contains: 3 times as many red beans as black-eyes, one more lima than red, 8 beans in all

8- Contains: an equal number of red beans and black-eyes, 5 more lima beans than black eyes, no more than 20 beans in all

Just the Facts!

You will need:

- CREATIVITY
- PATIENCE

Learning the basic math facts is important. Here are some suggestions for helping your child to learn the facts.

- Practice with **just one fact** per day. Repeat the fact with your child many times during the day. Say it, write it, draw it, act it out. Anything that will help it stick in your child's memory.
- Use creativity to repeat the "fact of the day". Use song, shouting, whispering, deep voices, high voices, maybe an animal voice. BE CREATIVE! This can make the repetition fun for children.
- Help your child to see that the facts are related. For example, 4x2=8, 2x4=8, 8/4=2, 8/2=4. This cuts down on the number of facts a child has to learn.

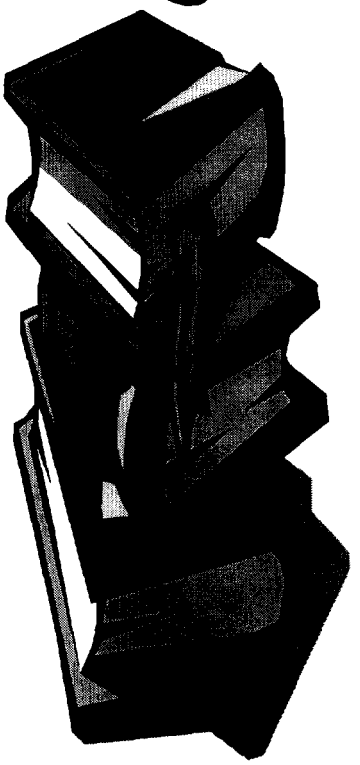
November 2001-Issue 3 (4-6)

Great Math Activities

Story Time

Reading to or with your child is EXTREMELY important! Read often! The next time you visit a local library, check out and read some of these great number stories:

- Popcorn by Frank Asch
- Anno's Mysterious Multiplying Jar by Masaichiro Anno and Mitsumasa Anno
- How Much is a Million? by David Schwartz
- Alexander, Who Used to be Rich Last Sunday by Judith Viorst
- A Job for Jenny Archer by Ellen Conford
- Twice Upon a Time by Irwin Shapiro
- The King's Chessboard by David Birch
- Emeka's Gift by Ifeoma Onyeflulu
- Eating Fractions by Bruce Mc Millan
- Splash! by Ann Jonas



Game Time

How Close Can You Get?

You will need:

- a deck of cards (use only the ace and 2, 3, 4, 5, 6, 7, 8, and 9 cards) no 10s or face cards! (THE ACE BECOMES THE 1 CARD)
- paper and pencil
- 2 to 5 players

Deal 6 cards face down to each player. The dealer then turns up 3 cards. The first card is the hundreds digit, the second is the tens digit, and the third is the ones digit. This becomes the TARGET NUMBER. *For example, if I turned a 6 then an Ace, then a 2, the target number would be 612.* Now players turn over their cards and try to arrange the digits to form 2 three- digit numbers. The idea is to be able to subtract the two numbers and get close to the target number. *In my example, if I had an Ace, 6, 3, and 9, 2, 7, I would arrange them to make 927-316 which equals 612. My score would be 1 because I was 1 away from the target number.* This is the end of the first round. Shuffle the deck and deal new cards and choose a new target number. Play for 5 rounds, each time recording the distance from the target number. At the end of 5 rounds, the player with the **lowest** total score wins! **You may also play this game with addition, multiplication, or division. You can also use only 2 digit numbers.**

Activities and information for this issue came from:

- Math Through Children's Literature by K.L. Braddon, N.J. Hall, and D. Taylor
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics
- Elementary and Middle School Mathematics by J.A. Van de Walle

November 2001-Issue 3 (4-6)

December 2001, Issue 4 (K-1)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Amazing Algebra!

HAPPY HOLIDAYS! The holidays are almost here! To many, that means some time off from work and often spending time with friends and relatives. Don't be afraid to spend a little bit of winter vacation time with your child working on these fun math activities. In fact, invite friends and relatives to participate too! Math can be fun for everyone! You might be surprised to see this month's topic. Many people think of algebra as a math topic that students do not begin studying until late in middle school or their freshman year of high school. However, the concepts behind algebra actually build throughout the elementary school math education, beginning in kindergarten. While the skills you see in this month's issue might not be exactly what you remember about algebra, these are the skills your child can learn now that will help him or her to succeed in algebra when that time comes. Kindergarten algebra skills are those of sorting and classifying. First graders can be expected to sort and classify, but also to formalize the computation skills and write and use number sentences including the symbols +, -, and =.

Still Inside...

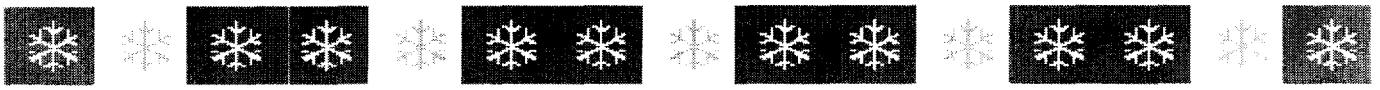
What to Expect from Your Child

in terms of **ALGEBRAIC SENSE**

Kindergarten

Your child should be able to:

- Identify, sort, and classify objects by size, number, and other characteristics.
  - For example, find the triangles in a group of shapes. Now sort the triangles into big triangles and small triangles. Explain how you decided where each triangle went.
- Identify objects that do not belong to a group.
- Identify, copy, and make simple patterns with numbers and shapes.
  - For example, make a pattern of triangles and hearts, one heart, two triangles. Repeat this pattern two times.



First Grade

Your child should be able to:

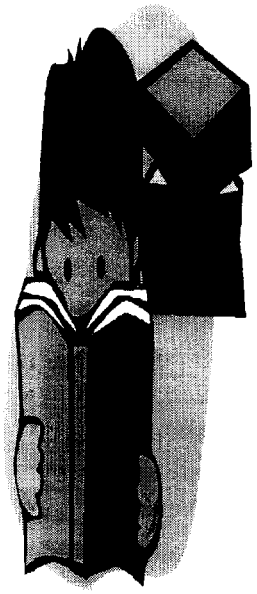
- Write and solve number sentences from problem situations involving addition and subtraction.
  - For example, you have 5 apples and your mom has 4 apples. Write a number sentence for how many apples you would have if you put all of your apples together. Use your number sentence to find the total number of apples.
- Create word problems that match given number sentences involving addition and subtraction.
  - For example, write a word problem that can be solved using the number sentence 4+5=9.
- Recognize and use the relationship between addition and subtraction.
  - For example, start with 5 apples. Add 4 more apples. Now take away 4 apples. How many do you have? Explain how you came up with that answer.

December 2001-Issue 4 (K-1)

Great Math Activities

The Great Sort

I am sure that you have things to sort around your house. Have your child help you sort them. You can involve your child in sorting laundry, sorting a drawer of socks, sorting money. Anything that you have around your house is great to help your child learn to sort. You can even cut out different sized shapes (squares, circles, triangles, ovals, hearts, stars, etc.) from different colors of construction paper. Then, your child can sort by color or size or shape all with these materials.



Make Up a Math Story

This activity is a repeat from last issue. If you didn't do it then, DO IT NOW! If you did it then, do it again! It's important! Try to make up a story problem using a specific number sentence, for example, 2+3=5. A possible story could be " *I had 2 cookies in my lunch. When I got to school, I got 3 more cookies from my teacher because I knew how to solve the daily math problem. When I went to lunch, I counted my cookies. How many did I have?*" I am sure that you and your child can come up with many great stories. Try to be creative and use addition and subtraction facts. Once you get good at making up the stories, try drawing pictures to illustrate the stories. Then, add the number sentence you were using at the bottom of your pictures. Keep these pictures and look at them with your child often over the next few weeks. These will help your child to learn and understand these math facts.

One of These Things is not Like the Others

You will need:

- Construction paper, markers, scissors
- Attribute materials (directions within activity)

First, you will need to make a set of attribute materials with your child. Attribute materials are sets of objects that can be sorted and classified. For this, I am suggesting using construction paper and markers to make an ice cream cone set. You will need to make one piece with each possible combination of attributes:
Make 9 of each type of cone (waffle and cake) and three pieces for vanilla. (One scoop of vanilla, two scoops of vanilla, three scoops of vanilla). Repeat making the ice cream pieces for chocolate and strawberry. Now, you should have 27 total pieces. Have your child sort these items and explain how decisions on classification were made. Next, pick 4 ice cream cones. Three of the cones should have something in common and one should be different. Have your child pick out which "one of these things is not like the others" and explain why he or she thinks that cone does not belong. This activity can have more than one answer, so be sure to listen to your child's reasons!

December 2001-Issue 4 (K-1)

Great Math Activities

MAKING PATTERN BLOCKS

You will need:

- construction paper, pencil, scissors

Pattern blocks are a math manipulative that are made up of six different geometric shapes. There are many activities that can be done with the pattern blocks. Make yourself a set to do activities included in this issue and save them for activities in future newsletters!

To make pattern blocks, use the pattern attached to this newsletter to cut out your own set of blocks. Make at least 20 of each shape. Save the pattern to make more if you need them later. Pattern blocks are always the same colors. In order to avoid confusing your child by using a set of pattern blocks at home that are different from the ones he or she may have used at school, **BE SURE TO USE THE SAME COLORS AS DIRECTED** on the pattern sheet!

Pattern Blocks

pattern block walls

Pattern Block Walls

You will need:

- Pattern Blocks (directions for pattern blocks were included above)
- paper and pencil

Pattern block walls are repeating patterns of blocks that form a straight edge on one side. One example would be hexagon-trapezoid-hexagon-trapezoid (see other examples above and below this box). Using your set of pattern blocks, try to make walls with your child. Make your design repeat five times. Also try starting a wall and have your child repeat your pattern to finish the wall. See how many different combinations you can make to create different pattern block walls!

Activities and information for this issue came from:

- The Super Source: Pattern Blocks Grades K-2 by Cuisenaire Company of America, Inc.
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics
- Elementary and Middle School Mathematics by J.A. Van de Walle

December 2001-Issue 4 (K-1)

December 2001, Issue 4 (2-3)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Amazing Algebra!

HAPPY HOLIDAYS! The holidays are almost here! To many, that means some time from work and often spending time with friends and relatives. Don't be afraid to spend a little bit of winter vacation time with your child working on these fun math activities. In fact, invite friends and relatives to participate too! Math can be fun for everyone! You might be surprised to see this month's topic. Many people think of algebra as a math topic that students do not begin studying until late in middle school or their freshman year of high school. However, the concepts behind algebra actually build throughout the elementary school math education, beginning in kindergarten. While the skills you see in this month's issue might not be exactly what you remember about algebra, these are the skills your child can learn now that will help him or her to succeed in algebra when that time comes. Second grade algebra skills focus on work with number relationships and creating and solving addition and subtraction problems. Third graders work on selecting appropriate symbols and operations to describe and solve number problems.

Still Inside...

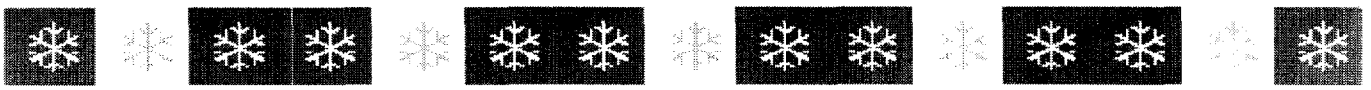
What to Expect from Your Child

in terms of **ALGEBRAIC SENSE**

Second Grade

Your child should be able to:

- Relate situations to number sentences with addition and subtraction.
- Understand that numbers can be added in any order, or grouped together in any combination.
    - For example, 5+4=4+5. Also, in problems with more than 2 numbers, the numbers can be arranged in any order before they are added together without changing the answer.
- Recognize and extend a linear pattern using its rules.
    - For example, one horse has 4 legs, two horses have 8, continue the pattern to find out how many legs 5 horses have.
- Continue number patterns using addition and subtraction.



Third Grade

Your child should be able to:

- Write number sentences to represent the relationship of two quantities.
- Solve problems involving numeric equations.
- Choose appropriate symbols to make a number sentence true.
- Understand that numbers can be multiplied in any order, or grouped together in any combination.
    - For example, 5x4=4x5. Also, in the case of 5x3x4 any two numbers may be multiplied first, then multiplied by the remaining number and the answer will be the same.
- Continue number patterns using multiplication.
- Solve simple problems using the relationship between two quantities.
    - For example, if one soda costs 50 cents, how much will 2, 3, 4, and 5 sodas cost? What pattern do you notice?
- Plot and label whole numbers on a number line including numbers 0 to 10.

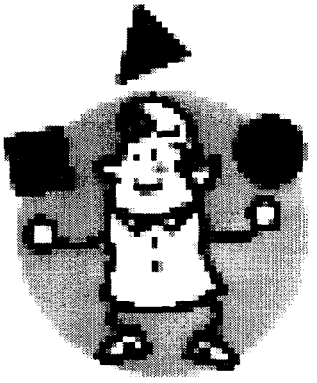
December 2001-Issue 4 (2-3)

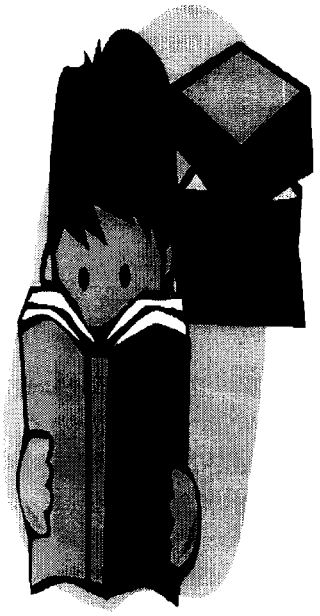
Great Math Activities

Trapezoids 1-16

You will need: pattern blocks (instructions on next page!)

The red pattern block shape is a trapezoid. This is the trapezoid for 1, because it is made with one block. Your job is to find a way to make a trapezoid with each number of blocks 1 to 16. THERE IS AT LEAST ONE WAY TO DO EACH OF THEM! Your trapezoids may be different sizes, but they should all be the same shape. What patterns did you notice about the ways that you could make trapezoids with different numbers of blocks?





Make Up a Math Story

This activity is in part a repeat from last issue. If you didn't do it then, DO IT NOW! If you did it then, do it again! It's important! Try to make up a story problem using a specific number sentence, for example, 2+3=5. One possibility for a story could be "*I had 2 cookies in my lunch. When I got to school, I got 3 more cookies from my teacher because I knew how to solve the daily math problem. When I went to lunch, I counted my cookies. How many did I have?*" I am sure that you and your child can come up with many great stories. Try to be creative and use addition, subtraction, multiplication, and division facts. Once you get good at making up the stories, try drawing pictures to illustrate the stories. Then add the number sentence you were using at the bottom. Also, you can take turns making up a story, then trying to develop the number sentence to solve the story problem.

What's Next?

You will need:

- pattern blocks
- paper and pencil
- crayons

Start by creating your own pattern with pattern blocks. Have your child tell you what he or she thinks the pattern is. Have him or her continue the pattern until you have used at least 15 blocks. Guess what the 23rd block will be? How did you decide on that answer? Draw the pattern on a piece of paper, coloring in the pieces. What do you think the 50th block will be? Make the pattern and check your prediction. Take turns with your child, making and completing patterns. If your child is very good at the pattern block patterns, try making number patterns. 1, 3, 5 would be an example of a number pattern created when 2 is added each time. You can use addition, subtraction, or multiplication to make your number patterns. If those are too easy, try using more than one operation. For example, 2, 5, 10, 13, 26. In this pattern, I first add 3 to get the next number, then I multiply by 2 to get the number after that, then I add 3 again, multiply by two, etc.

December 2001-Issue 4 (2-3)

Great Math Activities

MAKING PATTERN BLOCKS

You will need:
- construction paper, pencil, scissors

Pattern blocks are a math manipulative that are made up of six different geometric shapes. There are many activities that can be done with the pattern blocks. Make yourself a set to do activities included in this issue and save them for activities in future newsletters!
To make pattern blocks, use the pattern attached to this newsletter to cut out your own set of blocks. Make at least 20 of each shape. Save the pattern to make more if you need them later. Pattern blocks are always the same colors. In order to avoid confusing your child by using a set of pattern blocks at home that are different from the ones he or she may have used at school, **BE SURE TO USE THE SAME COLORS AS DIRECTED** on the pattern sheet!

Pattern Blocks

pattern Block walls

Pattern Block Walls

You will need:
- Pattern Blocks (directions for pattern blocks were included above)
- paper and pencil

Pattern block walls are repeating patterns of blocks that form a straight edge on one side. One example would be hexagon-trapezoid-hexagon-trapezoid (see other examples above and below this box). Using your set of pattern blocks, try to make walls with your child. Make your design repeat 5 times. Also try starting a wall and have your child repeat your pattern to finish the wall. See how many different combinations you can make to create different pattern block walls!

Activities and information for this issue came from:
- The Super Source: Pattern Blocks Grades K-2 by Cuisenaire Company of America, Inc.
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics
- Elementary and Middle School Mathematics by J.A. Van de Walle

December 2001-Issue 4 (2-3)

December 2001, Issue 4 (4-6)

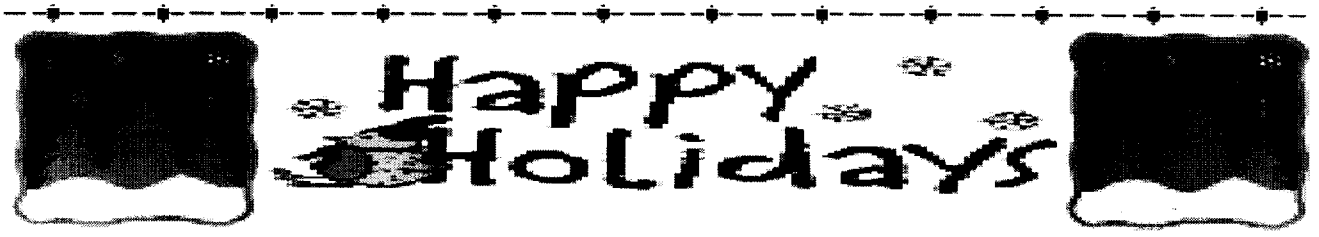
It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Amazing Algebra!

HAPPY HOLIDAYS! The holidays are almost here! To many, that means some time off of work and often spending time with friends and relatives. Don't be afraid to spend a little bit of winter vacation time with your child working on these fun math activities. In fact, invite friends and relatives to participate too! Math can be fun for everyone! You might be surprised to see this month's topic. Many people think of algebra as a math topic that you do not start to study until late in middle school or freshman year of high school. However, the concepts behind algebra actually build throughout the elementary school math education beginning in kindergarten. While the skills you see in this month's issue might not be exactly what you remember about algebra, these are the skills your child can learn now that will help him or her to succeed in algebra when that time comes. Fourth grade algebra skills focus on use and interpretation of variables, math symbols, and writing and simplifying number sentences. Fifth graders continue work on variables, including plotting results on a 2-dimensional grid, while sixth grade works with more traditional algebra, linear equations, graphs, and algebraic expressions.



Still Inside...

What to Expect from Your Child

in terms of **Algebraic Sense**

Fourth Grade

Your child should be able to:

- Understand and use a variable to represent an unknown number.
- Use and interpret formulas to answer questions about quantities and their relationships.
- Understand multiplication and division are performed before addition and subtraction in expressions without parentheses.
- Understand that an equation such as y=3x+5 is a rule for finding a second number when a first number is given.
- Continue number patterns using multiplication and division.
- Recognize and apply the relationships between addition and multiplication, between subtraction and division, and between multiplication and division to help solve problems.
- Relate problem situations to number sentences involving multiplication and division.
- Plot and label whole numbers on a number line up to 100. Estimate positions on the number line.

Fifth Grade

Your child should be able to:

- Use a variable to represent an unknown number.
- Write simple algebraic expressions with one or two variables and solve them using substitution.
- Identify and graph ordered pairs of positive numbers.
- Find ordered pairs of positive numbers that fit a linear equation, graph the ordered pairs, and draw the line they determine.
- Understand that the length of a horizontal line segment equals the difference in the x-coordinates, and the length of a vertical line segment equals the difference in the y-coordinates.
- Use information taken from a graph or equation to answer questions about a problem situation.

Sixth Grade

Your child should be able to:

- Write and solve one step linear equations and inequalities with one variable, and check the answers.
- Write and use formulas with up to three variables to solve problems.
- Solve equations that use symbols, such as parentheses to group numbers.
- Use parentheses to indicate which operation to perform first in expressions with more than two terms and multiple operations.
- Use variables in expressions describing geometric quantities.
- Apply the correct order of operations when evaluating numerical expressions.
- Identify and graph ordered pairs in the 4 quadrants of the coordinate plane.
- Solve problems involving linear functions with integer values.
- Investigate how a change in one variable relates to a change in a second variable.

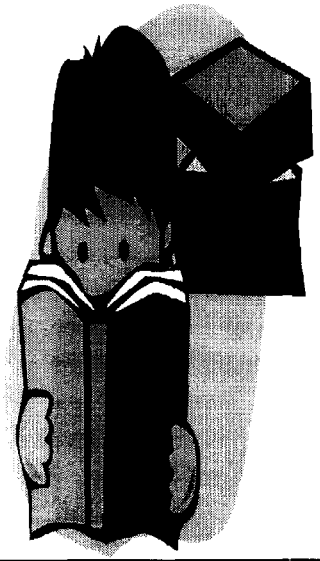
December 2001-Issue 4 (4-6)

Great Math Activities

Guess My Number Pattern

You will need: Paper and pencil

Use multiplication, division, addition, subtraction, or a combination of these to create a number pattern. For example, 54, 45, 36, 27, ... See if your child can figure it out. If he or she figures it out on the first guess, he or she gets 5 points. A second guess scores only 4 points, and so on. Then have your child make a pattern for you and see if you can figure it out. Follow the same point scale for your guesses. See how many patterns you can come up with and how many points you can earn.



Magic Squares

You will need:

- What's the Big Idea, Ben Franklin? by Jean Fritz
- paper and pencil
- patience!

Ben Franklin is known for many creative innovations. One of Ben's hobbies was constructing a number puzzle called magic squares. To make a magic square, you arrange numbers in a grid (3 squares by 3 squares, like tic-tac-toe). The catch is that all the numbers must add to the same total across, down, and diagonally. Use the book, What's the Big Idea, Ben Franklin? to take a look at an example of these magic squares. Then try to make your own! To make the activity more challenging, you can use multiplication instead of addition.

NIM

You will need:

- 20 or more small objects (pennies, beans, buttons, anything else you have at home)
- STRATEGY!

This strategy game is more than 2000 years old and is said to have originated in China. Originally, people played using small stones, but any collection of small objects you have at your house will work to play this game.

Begin by arranging the objects into groups. Each group may have between 3 and 6 objects. The groups do not have to be equal, but they can be if you wish them to be. On each turn, take away part or all of a group. The player that takes the last piece wins.

Another version can be played by putting 20 pieces in a row. On each turn, a player may take away one, two, or three pieces. If you force the other player to take the last piece, you win!

Try making up your own version once you have mastered these games!

1 2 3 4 5 6 7 8 9 10

December 2001-Issue 4 (4-6)

Great Math Activities

Coordinate Tic-Tac-Toe

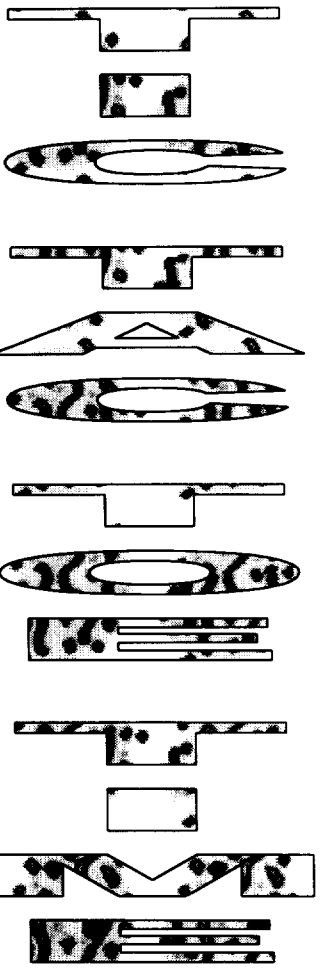
You will need:

- graph paper (at least 10 squares by 10 squares)
- markers (2 different colors)
- 2 players or 2 teams

First, you will need to number your grid lines from 0 to 10 both across and up. (Just like you would number a graph. The 0 should be the same point for both across and up.)

The object of this game is to get 4 marks in a row. All marks are placed on the point formed by the intersection of two lines. It is played in the same way as traditional tic-tac-toe, except that the player must name the point marked by its ordered pair name. The ordered pair name is the number of the across line, then the number of the up line. Also, one player is the "lead player". The lead player records the ordered pairs that have been marked. Ordered pairs are written (across (left or right), (up or down)), for example (2, 8) would be over two spaces and up 8.

If you are comfortable with the four-quadrant coordinate grid, you can use this in later games. Make sure that if you do use the four-quadrant grid, record if the number is positive or negative when recording ordered pairs. (The skill of working with the four-quadrant grid isn't expected of children until they are in the sixth grade.)



Anno's Hat Tricks

You will need:

- Anno's Hat Tricks by Nozaki and Anno
- paper and pencils
- red and white construction paper

Read the book with your child. When you read through the book a second time, try some of the puzzles. Try using some construction paper and making some red and white hats to use to act out the problems. Note: The puzzles in the book start easy and get harder. Do not expect your child to be able to solve all of the puzzles, especially the first time.

Activities and information for this issue came from:

- Curriculinks Grades 5-6 by Christy Fong
- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Indiana Standards 2000- Mathematics

December 2001-Issue 4 (4-6)

January 2002, Issue 5 (K-1)

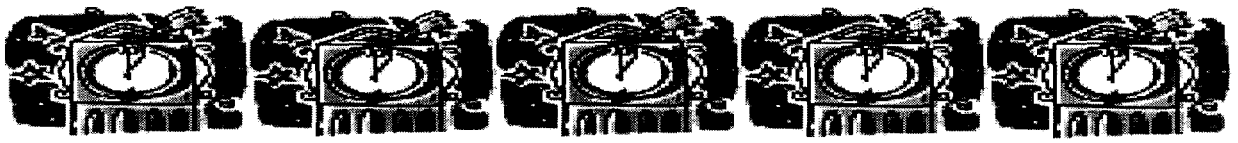
It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Getting to Know Geometry

Happy New Year! I hope that the year 2002 finds you happy and healthy, rested and ready to get back to work and to school. We are beginning this new year with one of my favorite math topics, geometry. I like geometry because there are so many fun things that you can do to explore shapes and patterns, the foundations of elementary school geometry. Both kindergarten and first grade students focus on recognizing, sorting, and drawing shapes. Geometry is one of those math topics that you can explore with your child and I think that you will enjoy it so much, you just might forget that you are working on math activities! You might even have so much fun you want to spend more time than the 15-20 minutes a few times a week that I have recommended setting aside for these activities. Also, this month, **you should have received an evaluation form** along with this newsletter. I am asking that you **PLEASE fill out the form and return it to your child's teacher**. The school will take care of getting it back to me. The information that I get back on this form will become an important part of my written thesis, so getting responses is **VERY IMPORTANT**! Thank you ahead of time for taking a few minutes of your time to fill out the evaluation.



Still Inside...

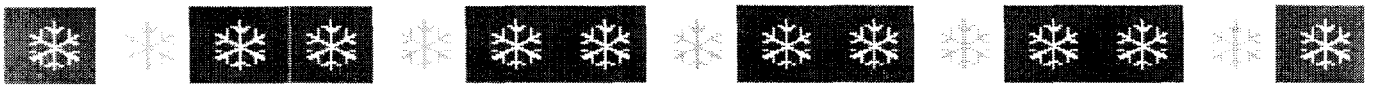
What to Expect from Your Child

in terms of GEOMETRY

Kindergarten

Your child should be able to:

- Identify and describe common geometric objects: circle, triangle, square, rectangle, and cube.
- Compare and sort common objects by position, shape, size, roundness, and number of corners.
- Identify and use the terms: inside, outside, between, above, below.



First Grade

Your child should be able to:

- Identify, describe, compare, sort, and draw triangles, rectangles, squares, and circles.
- Identify triangles, rectangles, squares, and circles as the sides of different three-dimensional objects.
- Classify and sort familiar two- and three-dimensional objects by position, shape, size, roundness, and other attributes. Explain the rule you used.
- Identify objects as two-dimensional (flat) or three-dimensional.
- Give and follow directions for finding a place or object.
- Arrange and describe objects in space by position and direction: near, far, under, over, up, down, behind, in front of, next to, to the left of, to the right of.
- Recognize shapes at home, in nature, at school, or other places you visit and record their location.

January 2002-Issue 5 (K-1)

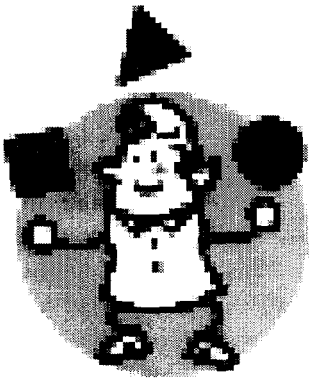
Great Math Activities

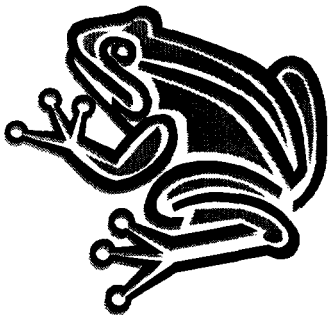
Three In a Row or Secret Builder

You will need:

- pattern blocks and/or tangrams (You can try this activity with both!) (Directions for tangrams are included on the next page)
- some sort of divider

Make a design with pattern blocks or tangrams. Then, with your design behind the divider and hidden from your child, give clues so that your child can construct your design without actually seeing it. (You may want to see the "what to expect" section which gives words your child needs to understand about describing placement of objects.) Then, switch roles and have your child make a design and give you clues.





Things with Legs

You will need:

- pattern blocks
- paper and pencil
- crayons or markers

Start by making a design using pattern blocks. Both you and your child should make a design of something that has legs (animal, person, bug, etc.) Once you come up with a design that you like trace around the pattern blocks on your paper, then color in the pieces the same colors as the blocks. Share your pictures with each other. How are they alike? How are they different? What different shapes do you see? Which one has more squares? Triangles? Hexagons? Trapezoids?
Feel free to make more than one picture!

Same and Different

You will need:

- a set of tangrams for you and one for your child (directions on the next page)
- paper and pencil/marker/crayon

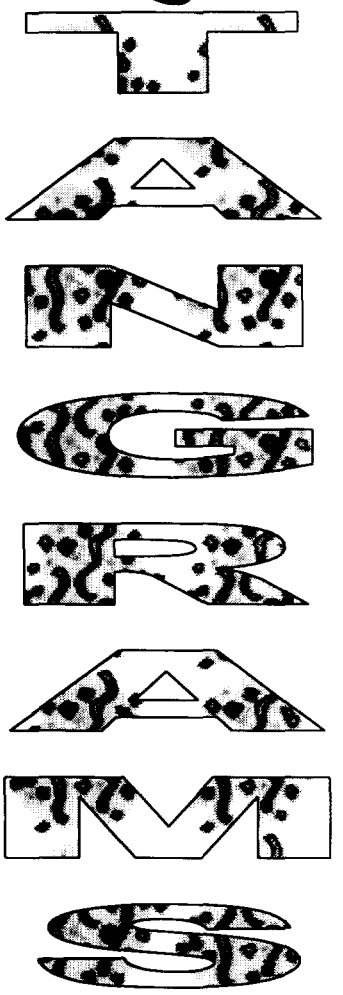
Pick up two different shaped pieces and talk with your child about how the pieces are the same and how they are different. Repeat this process until you feel that your child has a good idea of how to compare the shapes. Now, work with your child, each of you using 4 tangram pieces to make a shape. When you have made your shapes, compare the shapes. Trace your shapes on a piece of paper and color them if you want to. Write on the paper things that you think are the same and things that you think are different about the shapes. Are shapes made from the same pieces always the same? Are shapes with the same number of pieces always the same size? Your child can even practice some math and writing skills by making a list of all of the things that can be compared using the tangram shapes.

Shapes AND Designs

January 2002-Issue 5 (K-1)

Great Math Activities

MAKING TANGRAMS

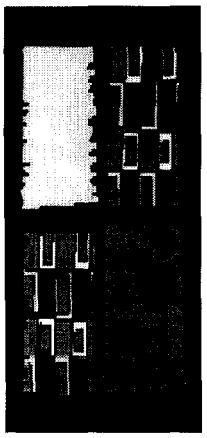


You will need:

- an empty cereal box
- scissors
- tape
- tangram pattern

Tangrams are a simple set of geometric shapes that can be used to explore many different types of mathematical ideas. A set of tangrams is made up of seven simple shapes, five triangles (two small triangles, one medium triangle, and two large triangles), one square, and one parallelogram. One special property of tangrams is that all 7 pieces can be arranged to form a square. (You might want to try that!)

Take the tangram pattern on the next page and tape it to an empty cereal box. Then cut out the pieces. Make two sets of tangrams, one for you and one for your child. You can color the two sets different colors if you wish. This will help you to keep the two sets separated. Make these sets and hold on to them. Future issues of this newsletter may have activities that use tangrams! But now that you have made your tangrams, you are ready to do the tangram activities in this issue!



Making a Quilt

You will need:

- 2 sets of tangram pieces
- construction paper
- crayons

Working with your child, use the 2 medium triangles and 4 small triangles from your 2 sets of tangrams. Use any 3 of the pieces to make a square. When you find a square you like, trace it on a piece of construction paper and color it. Continue making square designs until you have made 3 squares across and 3 squares down (the same as a filled up tic-tac-toe board). You should have 9 squares in your quilt. How could you make your quilt different? Try making a different quilt, or maybe each of you could make your own quilt, and then compare your designs.

Activities and information for this issue came from:

- The Super Source: Pattern Blocks Grades K-2 by Cuisenaire Company of America, Inc.
- The Super Source: Tangrams Grades K-2 by Cuisenaire Company of America, Inc.
- Indiana Standards 2000- Mathematics

January 2002-Issue 5 (K-1)

January 2002, Issue 5 (2-3)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Getting to Know Geometry

Happy New Year! I hope that the year 2002 finds you happy and healthy, rested and ready to get back to work and to school. We are beginning this new year with one of my favorite math topics, geometry. I like geometry because there are so many fun things that you can do to explore shapes and patterns, the foundations of elementary school geometry. Both second and third grade students work on describing and comparing the attributes of geometric figures. Geometry is one of those math topics that you can explore with your child and I think that you will enjoy it so much, you just might forget that you are working on math activities! You might even have so much fun you want to spend more time than the 15-20 minutes a few times a week that I have recommended setting aside for these activities. Also, this month, **you should have received an evaluation form** along with this newsletter. I am asking that you **PLEASE fill out the form and return it to your child's teacher**. The school will take care of getting it back to me. The information that I get back on this form will become an important part of my written thesis, so getting responses is **VERY IMPORTANT**! Thank you ahead of time for taking a few minutes to fill out the evaluation.

Still Inside...

What to Expect from Your Child

in terms of **GEOMETRY**

Second Grade

Your child should be able to:

- Construct squares, rectangles, triangles, cubes, and rectangular prisms with appropriate materials.
- Describe, classify, and sort: triangles, squares, rectangles, cubes, rectangular prisms (boxes with 6 rectangles for sides) according to the number and shape of the faces (flat sides), edges, and corners.
- Investigate and predict the result of putting together and taking apart two- and three-dimensional shapes.
- Identify congruent (same size and same shape) two-dimensional shapes in any position.
- Recognize geometric shapes and structures when looking at things around you, and tell people where the shapes are located.

Third Grade

Your child should be able to:

- Identify quadrilaterals as four-sided shapes.
- Identify right angles in shapes and objects and decide whether other angles are greater or less than a right angle.
- Identify, describe, and classify: cube, sphere (round ball), pyramid, cone, and cylinder.
- Identify common solid objects that are the parts needed to make up a more complex solid object.
    - For example, explain how a house is made up of prisms and pyramids.
- Draw a shape that is congruent to (same size and shape) as another shape.
- Use terms point, line, and line segment in describing 2-dimensional shapes.
- Draw line segments and lines.
- Identify and draw lines of symmetry in geometric shapes.
- Draw the mirror image reflections of shapes.
- Recognize shapes and their properties in the environment and tell where they are located.

January 2002-Issue 5 (2-3)

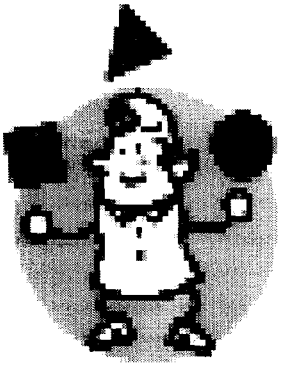
Great Math Activities

Build My Shape

You will need:

- pattern blocks and/or tangrams (You can try this activity with both!) (Directions for tangrams included on next page.)
- some sort of divider

Make a design with pattern blocks or tangrams. Then, with your design behind the divider and hidden from your child, give clues so that your child can construct your design without actually seeing it. (You may want to see the "what to expect" section which gives words your child needs to understand about describing placement of objects. Then, switch roles and have your child make a design and give you clues.



Mirror Magician

You will need:

- 2 sets of tangrams (directions included on next page)
- paper
- mirror

Stand in front of a mirror with your child. Draw your child's attention to the way that everything is reflected in the mirror. Now, face your child and pretend that there is a mirror between you. If you put your right hand on your hip, your child should mirror you by placing his or her left hand on his or her hip. Once your child understands the concept of mirror image, you are ready to play the game. One of you will be the chooser, the other will be the mirror magician. Fold the piece of paper in half. The fold line is your pretend mirror. The chooser puts down one tangram piece with one of the shape's sides touching the mirror. The mirror magician puts down a piece on the other side, the mirror image. The chooser then puts down 3 more pieces and the mirror magician mirrors those pieces. Now switch roles and play again. Talk about how you decided where to put the mirror image pieces.

Recover the Symmetry

You will need:

- pattern blocks

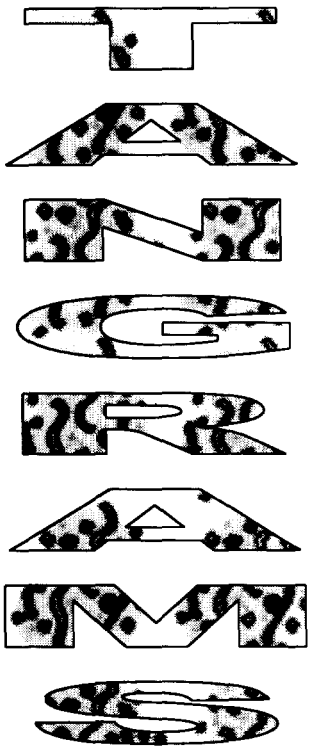
Together, build a symmetrical design with your child using 12 pattern blocks. This means that you should be able to fold your design in half and the pieces would fit exactly on top of one another. (In mirror magician, the mirrored pieces modeled symmetry with the chooser's pieces!) Make sure that your design is symmetrical in shape, but also symmetrical in color. You can use a small mirror to check to see if the design is symmetrical. Now, one player turns around and closes his or her eyes while the other player moves 3 blocks so that the design is no longer symmetrical. The player then opens his or her eyes and tries to "recover the symmetry" by figuring out which 3 blocks were moved and trying to move them back to their original position to make the design symmetrical again. Is the new design symmetrical? Were the same 3 blocks moved to correct the design? Is the new design the same as the original one? Switch roles and play again. When you get very good at this game, try using a stopwatch to see how long it takes you to find the moved blocks and to correct the design. *Please note that it is not important that your child be able to do this quickly, it just makes the game fun.*

Recover THE symmetry

January 2002-Issue 5 (2-3)

Great Math Activities

MAKING TANGRAMS



You will need:

- an empty cereal box
- scissors
- tape
- tangram pattern

Tangrams are a simple set of geometric shapes that can be used to explore many different types of mathematical ideas. A set of tangrams is made up of seven simple shapes, five triangles (two small triangles, one medium triangle, and two large triangles), one square, and one parallelogram. One special property of tangrams is that all 7 pieces can be arranged to form a square. (You might want to try that!)

Take the tangram pattern on the next page and tape it to an empty cereal box. Then cut out the pieces. Make two sets of tangrams, one for you and one for your child. You can color the two sets different colors if you wish. This will help you to keep the two sets separated. Make these sets and hold on to them. Future issues of this newsletter may have activities that use tangrams! But now that you have made your tangrams, you are ready to do the tangram activities in this issue!

Spaghetti Shapes

Using uncooked spaghetti and mini-marshmallows, have your child construct different shapes. It is possible to make shapes such as pyramids as well as triangles and squares. Use the spaghetti for the sides and the marshmallows to connect the pieces and make the corners. Try using pipe cleaners along with the spaghetti to make things with curved parts, like circles and cylinders. You can still use the marshmallows to join the ends together. Have some fun and you can eat the extra marshmallows! YUMMY!

Shape Sleuth

You will need:

- detective eyes

Look around you! Where do you see shapes? Do you see any shapes in your room? In the kitchen? In the bathroom? Outside? On different buildings? In the park?

Keep your eyes open and watch out! Shapes are everywhere! Be a shape detective. Have your child point out to you the shapes that he or she sees around your house, at the park, at the mall, etc.

Activities and information for this issue came from:

- The Super Source: Pattern Blocks Grades 3-4 by Cuisenaire Company of America, Inc.
- The Super Source: Tangrams Grades K-2 by Cuisenaire Company of America, Inc.
- Indiana Standards 2000- Mathematics

January 2002-Issue 5 (2-3)

January 2002, Issue 5 (4-6)

It All Adds Up

By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Getting to Know Geometry

Happy New Year! I hope that the year 2002 finds you happy and healthy, rested and ready to get back to work and to school. We are beginning this new year with one of my favorite math topics, geometry. I like geometry because there are so many fun things that you can do to explore shapes and patterns, the foundations of elementary school geometry. Fourth grade geometry focuses on student's understanding of geometric constructions and their ability to use the relationships between shapes to solve problems. Fifth grade and sixth grade students focus on identification, description, and classification of geometric shapes. Geometry is one of those math topics that you can explore with your child and I think that you will enjoy it so much, you just might forget that you are working on math activities! You might even have so much fun you want to spend more time than the 15-20 minutes a few times a week that I have recommended setting aside for these activities. Also, this month, **you should have received an evaluation form** along with this newsletter. I am asking that you **PLEASE fill out the form and return it to your child's teacher**. The school will take care of getting it back to me. The information that I get back on this form will become an important part of my written thesis, so getting responses is **VERY IMPORTANT**! Thank you in ahead of time for taking a few minutes to fill out the evaluation.

Still Inside...

What to Expect from Your Child

in terms of GEOMETRY

Fourth Grade

Your child should be able to:

- Identify, describe, and draw rays, right angles, acute angles, obtuse angles, and straight angles using appropriate technology and tools.
- Identify, describe, and draw parallel, perpendicular, and oblique lines using appropriate technology and tools.
- Identify, describe, and draw parallelograms, rhombuses, and trapezoids, using appropriate mathematical tools and technology.
- Identify congruent quadrilaterals and give reasons for congruence using sides, angles, parallels, and perpendiculars.
- Identify and draw lines of symmetry in polygons.
- Construct cubes and prisms and describe their attributes.

Fifth Grade

Your child should be able to:

- Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and circles using appropriate tools.
- Identify, describe, draw, and classify triangles as equilateral, isosceles, scalene, right, acute, obtuse, and equiangular.
- Identify congruent triangles and justify your decision by referring to sides and angles.
- Identify, describe, draw, and classify two -dimensional shapes with straight sides, such as pentagons or hexagons.
- Identify and draw the radius and diameter of a circle and understand the relationship between them.
- Identify shapes that have reflectional and rotational symmetry.
- Understand that 90 degrees, 180 degrees, 270 degrees, and 360 degrees are associated with $\frac{1}{4}$. $\frac{1}{2}$. $\frac{3}{4}$. and full turns (respectively).
- Construct prisms and pyramids using appropriate materials.
- Given a picture of a 3-dimensional object, build the object with blocks.

Sixth Grade

Your child should be able to:

- Identify and draw vertical, adjacent, complementary, and supplementary angles, and describe the relationships between these angles.
- Use the properties of complementary, supplementary, and vertical angles to solve problems involving an unknown angle. Justify your solution.
- Draw quadrilaterals and triangles from given information about them.
- Understand that the sum of the interior angles of any triangle is 180 degrees and that the sum of the interior angles of any quadrilateral is 360 degrees. Use understanding to solve problems.
- Identify and draw 2-dimensional shapes that are similar (same shape) using appropriate mathematical tools and technology.
- Draw the translation (slide) and reflection (flip) of shapes.
- Visualize and draw 2-dimensional views of 3-dimensional objects made from rectangular solids.

January 2002-Issue 5 (4-6)

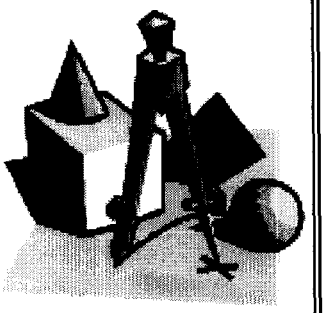
Great Math Activities

The Boy With Square Eyes

You will need:

- The Boy With Square Eyes by Juliet Snape and Charles Snape

Check out this book from a local library. Read it with your child. After reading the story, talk with your child about what you think it would be like to see everything as squares, or everything made up of straight lines and no curves. Try drawing pictures of things in your house or backyard using only squares and straight lines. After you draw your pictures, write a story about what life would be like if you saw things as Charlie does in the story.



Super Solids

You will need:

- 101 Science Tricks by Roy Richards
- pencil
- construction paper
- tape
- scissors
- pattern blocks or other shape patterns

Have your child trace pattern blocks to create the pieces for this activity. After you cut out a good supply of these shapes, try to create the following solids: the tetrahedron (using 4 triangles), the hexahedron (using 6 squares), the octahedron (using 8 triangles), the dodecahedron (using 12 pentagons), and the icosahedron (using 20 triangles). Use tape to hold the edges of your shapes together. If you need assistance, the 101 Science Tricks book contains instructions for building the five solids.

Recover the Symmetry

You will need:

- pattern blocks

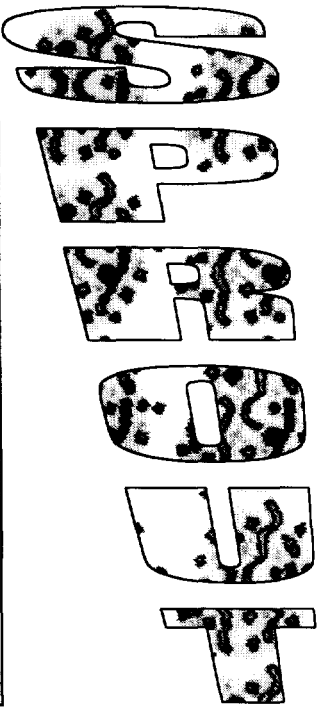
Together, build a symmetrical design with your child using 12 pattern blocks. This means that you should be able to fold your design in half and the pieces would fit exactly on top of one another. (In mirror magician, the mirrored pieces modeled symmetry with the chooser's pieces!) Make sure that your design is symmetrical in shape, but also symmetrical in color. You can use a small mirror to check to see if the design is symmetrical. Now, one player turns around and closes his or her eyes while the other player moves 3 blocks so that the design is no longer symmetrical. The player then opens his or her eyes and tries to "recover the symmetry" by figuring out which 3 blocks were moved and trying to move them back to their original position to make the design symmetrical again. Is the new design symmetrical? Were the same 3 blocks moved to correct the design? Is the new design the same as the original one? Switch roles and play again. When you get very good at this game, try using a stopwatch to see how long it takes you to find the moved blocks and to correct the design. *Please note that it is not important that your child be able to do this quickly, it just makes the game fun.*

Recover THE Symmetry

January 2002-Issue 5 (4-6)

Great Math Activities

SPROUT



You will need:

- 2 players
- paper
- markers, pens, or pencils

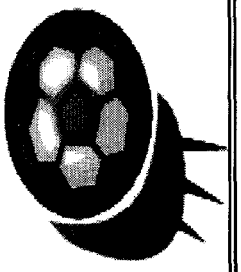
Draw two points (dots) on your paper. The two players take turns drawing lines according to the following rules:

- ★ A line must start and end at a point.
- ★ You can use curved lines.
- ★ The line can start and end at the same point, if you wish.
- ★ After you draw a line, you must draw a new point somewhere on that new line.
- ★ No line can cross itself or another line.
- ★ No line can pass through a point.
- ★ No point can have more than 3 lines beginning or ending at it.

The winner is the last person that is able to play. Try this game several times and see if you can develop a strategy for winning.

Spaghetti Shapes

Using uncooked spaghetti and mini-marshmallows (or gumdrops), have your child construct different shapes. It is possible to make shapes such as pyramids as well as triangles and squares. Use the spaghetti for the sides and the marshmallows to connect the pieces and make the corners. Try using pipe cleaners along with the spaghetti to make things with curved parts, like circles and cylinders. You can still use the marshmallows to join the ends together. Have some fun and you can eat the extra marshmallows or gumdrops! YUMMY!



Soccer Ball Exploration

You will need:

- paper
- pencil
- Different types of balls

Look at the surface of the balls. See what different shapes make up the ball. Sort the balls by the flat shapes that make up their surface. Now, look more closely at a soccer ball. What shape makes up a soccer ball? Are all of the shapes the same? Try drawing the shapes on a piece of paper. Find the area of the ball using your sketch.

Activities and information for this issue came from:

- The Super Source: Pattern Blocks Grades 3-4 by Cuisenaire Company of America, Inc.
- Curriculinks Grades 5-6 by C. Fong
- Indiana Standards 2000- Mathematics
- Math Through Children's Literature by K.L. Braddon, N.J. Hall, D. Taylor.

January 2002-Issue 5 (4-6)

February 2002, Issue 6 (K-1)

It All Adds Up

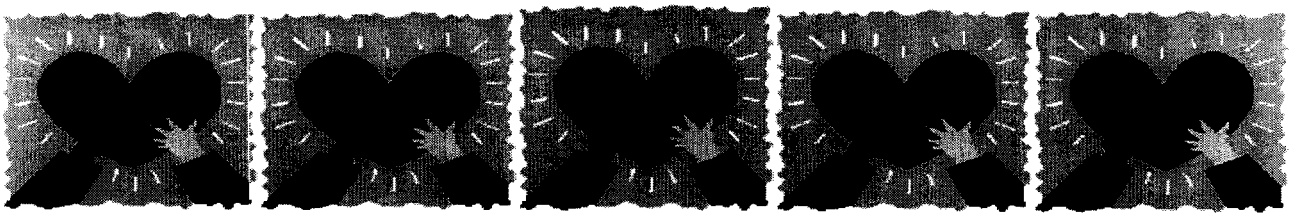
By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Merry Measurement

Happy Valentines Day! The love that you share with family and friends this month is something that cannot be measured, but humans have been trying to measure things since the beginning of time. We measure distance, length, time, and value. We put measurements on almost everything, making measurement one of those math skills that will be used by your child almost daily as he or she grows and matures. Kindergarten measurement skills focus on the concept of time and how it is measured. Children should also understand that objects have length, capacity, weight, and temperature, and that objects can be compared using these qualities. First grade children work on measuring length and comparing, ordering and describing other kinds of measurement.

Just a reminder--last month, **you should have received an evaluation form** along with the newsletter. If you haven't already, **PLEASE fill out the form and return it to your child's teacher**. The information that I get back on this form will become an important part of my written thesis, so getting responses is **VERY IMPORTANT**! If you have already returned your form, THANK YOU!



Still Inside...

What to Expect from Your Child

in terms of **MEASUREMENT**

Kindergarten

Your child should be able to:

- Make direct comparisons of the length, capacity, weight, and temperature of objects.
- Recognize which object is shorter, taller, lighter, heavier, warmer, cooler, holds more, holds less, etc.
- Show an understanding of the concepts of time: morning, afternoon, evening, today, yesterday, tomorrow, week, month, and year.
- Understand that clocks and calendars are tools for measuring time.

First Grade

Your child should be able to:

- Measure the length of objects by repeating a non-standard or a standard unit.
- Use different units to measure the length of the same object and predict whether the measurement will be greater or smaller when a different unit is used.
- Recognize the need for a fixed unit of length.
- Measure and estimate the length of an object to the nearest inch and centimeter.
- Compare and order objects according to area, capacity, weight and temperature using direct comparison or a non-standard unit.
- Tell time to the nearest half-hour and relate time to events (shorter/longer, before/after).
- Identify and give the values of pennies, nickels, and dimes.

February 2002-Issue 6 (K-1)

Great Math Activities

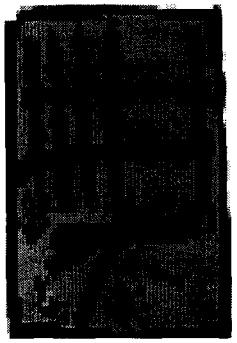
Measuring and Munching

You will need:

- pretzel sticks, grapes, baby carrots, etc.
- gummy worms, sticks of gum, sweet tarts, etc.
- (you can use your own imagination for other tasty items to use)

Get out ten of your objects. Imagine them laid out end to end on the table. Estimate how far they will go. Put something down to mark where you think they will end. Now, actually lay out the objects and see how close you can come. Try this activity again with a different food item. When you have finished measuring, have fun munching!

Fences for Fields



You will need:

- tangrams (directions provided in the January issue)
- string or yarn
- 20 small paperclips
- scissors
- paper and a marker or pencil

Take the two large tangram triangles. Put the two longest sides together to make a square. Trace around this shape on the paper. Now, put the two triangles together with two of the short sides together to form a large triangle. Trace around this shape on the same piece of paper. Ask your child to explain to you which shape is the biggest. Try to explain that both shapes are made up of the same 2 pieces, so they cover the same amount of space. Put string or yarn around the edges of the two pieces and cut the string so it fits exactly. Compare the two lengths. One should be smaller than the other. Now, use the two medium triangles, the square, and one large triangle to make a field. Use the string or paperclips to measure the distance around the field. This would be the amount of fencing you would need to enclose the field. Use the 4 pieces to make many different size fields. Compare the lengths of fencing you would need. Which shape needs the most fencing? Which needs the smallest amount of fence?

Balance the Scales

You will need:

- a wire coat hanger
- 2 paperclips
- 2 light-weight paper or plastic cups
- small objects to use to balance (jellybeans, pennies, dried beans, etc.)

Make a balance with your child by attaching a paperclip to each of the cups. Use the paperclip to attach the cups to the coat hanger. Put one cup on each side. Hang the balance on a hook or handle somewhere where you and your child can easily reach it. Now, use the cups on each side to try balancing experiments. For example, estimate how many jellybeans it will take to balance 3 pennies. Then put 3 pennies in one of the cups. Put jellybeans in the other cup until the hanger seems balanced again. Remove the jellybeans from the cup and count them. How close was your estimate? Try the experiments again and see if you can get closer balancing two other objects.

Balance THE Scales

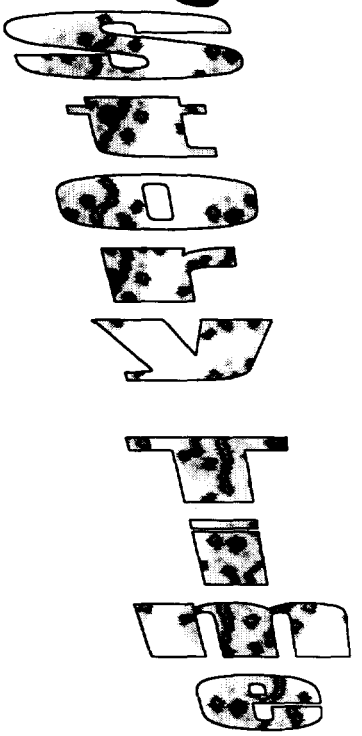
February 2002-Issue 6 (K-1)

Great Math Activities

Story Time

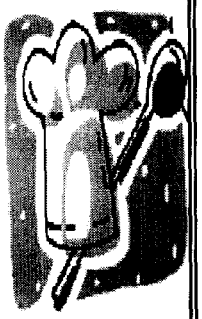
Reading to your child is EXTREMELY important! Read together often! The next time you visit a local library, check out and read some of these great measurement stories:

- ★ The Grouchy Ladybug by Eric Carle
- ★ Pezzettino by Leo Lionni
- ★ Space, Shapes, and Sizes by Jane Jonas Srivastava
- ★ Heavy is a Hippopotamus by Miriam Schlein
- ★ The Day the Monday Ran Away by Robert Heit
- ★ 8,000 Stones: A Chinese Folktale by Diane Wolkstein
- ★ The Carrot Seed by Ruth Krauss
- ★ Jim and the Beanstalk by Raymond Briggs
- ★ Ten Beads Tall by Pam Adams
- ★ Inch by Inch by Leo Lionni
- ★ Counting on Frank by Rod Clement



How Big is a Foot?

Read the story How Big is a Foot? by Rolf Myller with your child. Read it a few times, acting it out if you like, with your child. What is wrong with the king measuring with his own foot? Trace your foot and your child's foot onto pieces of paper and cut them out. Measure different things around your house, using these feet as your rulers. Measure the same objects that your child does and compare your measurements. Would you have the same problems that the king did in the story?



Cooking Corner

Cooking is one daily activity that requires a lot of measuring. Try this tasty recipe or use one of your own with your child. **It is tasty math practice!**

Pumpkin Cupcake (makes *ONE* cupcake)

2 tablespoons yellow cake mix
3 tablespoons pumpkin pie filling mix
1 tablespoon beaten egg
4 chocolate chips

Help your child to measure and combine the first 3 ingredients in a bowl. Mix well. Pour the mixture into one cup of a cupcake pan. Top with the chocolate chips. Bake at 350 degrees for 20 minutes.

Activities and information for this issue came from:

- Family Math by J.K. Stenmark, V. Thompson, and R. Cossey
- Curriculinks Grades K-2 by K. Saxe
- Indiana Standards 2000- Mathematics
- Math Through Children's Literature by K.L. Braddon, N.J. Hall, D. Taylor.
- The Super Source: Tangrams Grades K-2 by Cuisenaire Company of America, Inc.

February 2002-Issue 6 (K-1)

February 2002, Issue 6 (2-3)

It All Adds Up

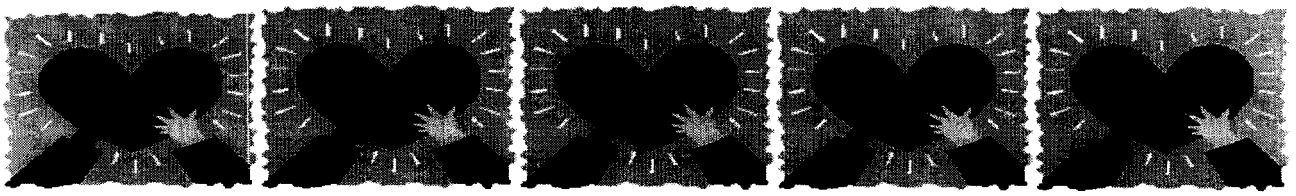
By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Merry Measurement

Happy Valentines Day! The love that you share with family and friends this month is something that cannot be measured, but humans have been trying to measure things since the beginning of time. We measure distance, length, time, and value. We put measurements on almost everything, making measurement one of those math skills that will be used by your child almost daily as he or she grows and matures. Second grade measurement skills focus on understanding of measuring length, temperature, capacity, weight, and time in standard units. Third graders work on choice and use of appropriate units for length, capacity, weight, temperature, time, and money.

Just a reminder--last month, **you should have received an evaluation form** along with the newsletter. If you haven't already, **PLEASE fill out the form and return it to your child's teacher**. The information that I get back on this form will become an important part of my written thesis, so getting responses is **VERY IMPORTANT**! If you have already returned your form, THANK YOU!



Still Inside...

What to Expect from Your Child

in terms of **MEASUREMENT**

Second Grade

Your child should be able to:

- Measure and estimate length to the nearest inch, foot, yard, centimeter, and meter.
- Describe the relationships among inches, feet, and yards. Describe the relationship between centimeters and meters.
- Decide which unit of length is most appropriate to explain a given situation.
- Estimate area and use a given object to measure the area of other objects.
- Estimate and measure capacity using cups and pints.
- Estimate weight and use a given object to measure the weight of other objects.
- Recognize the need for a fixed unit of weight.
- Estimate temperature. Read a thermometer in Celsius and Fahrenheit.
- Tell time to the nearest quarter hour, be able to tell five-minute intervals, and know the difference between a.m. and p.m.
- Know the relationship of time: seconds in a minute, minutes in an hour, hours in a day, days in a week, and days, weeks, and months in a year.
- Find the duration of intervals of time in hours.
- Identify and give the values of quarters, half-dollars, and dollars.

Third Grade

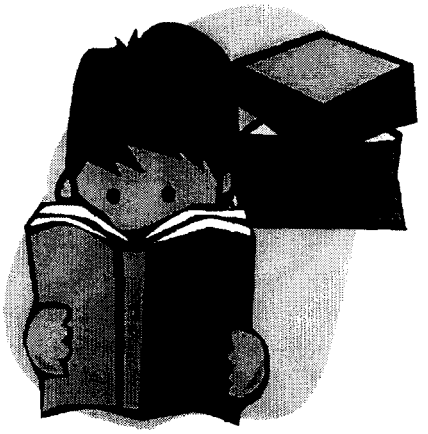
Your child should be able to:

- Measure line segments to the nearest half-inch.
- Add units of length that may require regrouping of inches to feet or centimeters to meters.
- Find the perimeter of a two-dimensional shape with straight sides (polygon).
- Estimate or find the area of shapes by covering them with squares.
- Estimate or find the volume of objects by counting the number of cubes that would fill them up.
- Estimate and measure capacity using quarts, gallons, and liters.
- Estimate and measure weight using pounds and kilograms.
- Compare temperature in Celsius and Fahrenheit.
- Tell the time on a clock to the nearest minute.
- Find the value of any collection of coins and dollars. Write amounts less than a dollar using the ¢ symbol and write larger amounts in decimal notation using the $ symbol.
- Use play or real money to decide if there is enough money to make a purchase.
- Carry out simple unit conversions within a measurement system (centimeters to meters, hours to minutes, etc.).

February 2002-Issue 6 (2-3)

Great Math Activities

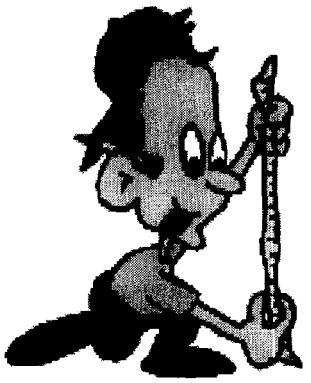
A Giant's Foot



You will need:

- The Iron Giant, a Story in Five Nights by Ted Hughes
- tape measure or rulers

Check out this book from a local library. Read it with your child. Stop reading suddenly in the middle of page 11 where the giant's foot comes down, "as big as a single bed." Before you continue the story, work with your child to figure out how big the giant must be. How big is a single bed? How big does that make his foot? How big is your foot? How big are you? How big do you think that the giant is? Once you have made an estimate, finish reading. At the end of the first chapter, see how close you were to the giant's actual size.



Size Them Up!

You will need:

- Pattern blocks (directions given in the December issue)--no orange or tan pieces
- scissors
- glue
- paper
- pencil

Remind your child that AREA means the space inside a shape. Put 3 blue pieces together to make one shape. Next to those pieces, put one red piece together with 2 green pieces. Ask your child which one has the bigger AREA. Why? How could you decide for sure which one was bigger? Now, each of you choose 6 blocks and make a design. Use only green, blue, red, and yellow. Trace the outline of the outside of your design and cut it out. Repeat this process, make another design, and cut it out. Now arrange your designs in order from smallest area to largest area. Have your child think of ways to check to see that your shapes are in the right order. Try to use all the ways you can think of. Were you right?

Weather Watchers

You will need:

- graph paper
- pencil
- local TV weather or newspaper

Decide on an amount of time (one week, two weeks, one month) with your child to watch the weather. Each day, have your child write down observations about the weather. Include in these observations comparisons to the previous day (it felt warmer/colder than yesterday). Then, use the newspaper or TV weather report and record the high and low temperatures (in both Celsius and Fahrenheit) on a chart or graph. At the end of your time period, compare your observations to your chart of the high and low temperatures. Were you right in your observations? What were the differences in each day's temperatures? How much did the high and low temperatures change? What patterns did you notice in the weather?

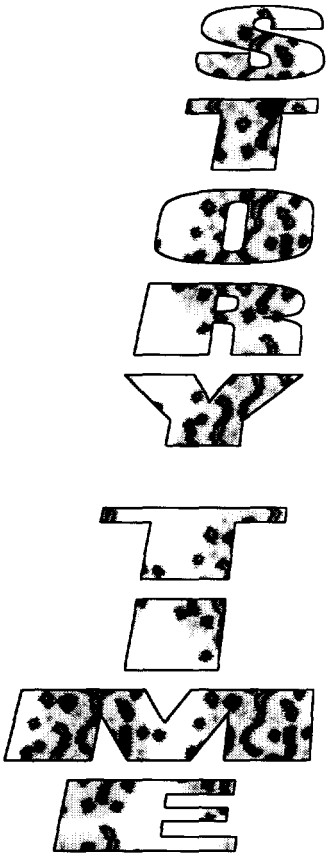
February 2002-Issue 6 (2-3)

Great Math Activities

Story Time

Reading to your child is EXTREMELY important! Read together often! The next time you visit a local library, check out and read some of these great measurement stories:

- ★ The Grouchy Ladybug by Eric Carle
- ★ Pezzettino by Leo Lionni
- ★ Space, Shapes, and Sizes by Jane Jonas Srivastava
- ★ Heavy is a Hippopotamus by Miriam Schlein
- ★ The Day the Monday Ran Away by Robert Heit
- ★ 8,000 Stones: A Chinese Folktale by Diane Wolkstein
- ★ The Carrot Seed by Ruth Krauss
- ★ Jim and the Beanstalk by Raymond Briggs
- ★ Ten Beads Tall by Pam Adams
- ★ Inch by Inch by Leo Lionni
- ★ Counting on Frank by Rod Clement
- ★ How Big is a Foot? by Rolf Myller



Cooking Corner

Cooking is one daily activity that requires a lot of measuring. Try this tasty recipe or use one of your own with your child. **It is tasty math practice!**

Pumpkin Cupcake (makes *ONE* cupcake)

2 tablespoons yellow cake mix
3 tablespoons pumpkin pie filling mix
1 tablespoon beaten egg
4 chocolate chips

Help your child to measure and combine the first 3 ingredients in a bowl. Mix well. Pour the mixture into one cup of a cupcake pan. Top with the chocolate chips. Bake at 350 degrees for 20 minutes.

Activities and information for this issue came from:

- The Super Source: Pattern Blocks Grades 3-4 by Cuisenaire Company of America, Inc.
- Curriculinks Grades K-2 by K. Saxe
- Indiana Standards 2000- Mathematics
- Math Through Children's Literature by K.L. Braddon, N.J. Hall, D. Taylor.
- Curriculinks Grades 3-4 by A. Roper

February 2002-Issue 6 (2-3)

February 2002, Issue 6 (4-6)

It All Adds Up

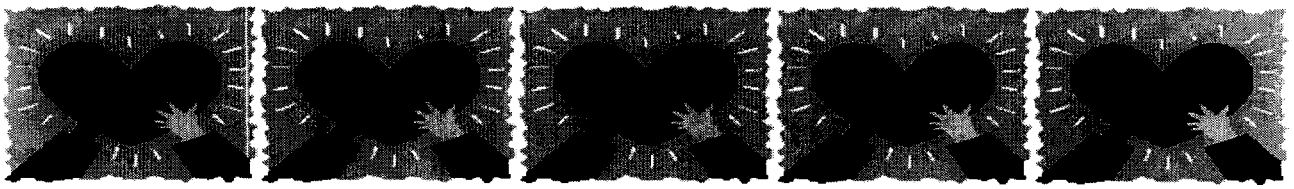
By Amy Ksander, Ball State University

Extending Mathematics from School to Home to Increase Student Success

Merry Measurement

Happy Valentines Day! The love that you share with family and friends this month is something that cannot be measured, but humans have been trying to measure things since the beginning of time. We measure distance, length, time, and value. We put measurements on almost everything, making measurement one of those math skills that will be used by your child almost daily as he or she grows and matures. Fourth grade measurement skills focus on understanding of perimeter and area, measuring volume, capacity, time, and money. Fifth graders work on measuring area, volume, weight, temperature, time, and money. Sixth grade students deepen their understanding of measurement, working with temperature, money, and choice of appropriate units of measurement.

Just a reminder--last month, **you should have received an evaluation form** along with the newsletter. If you haven't already, **PLEASE fill out the form and return it to your child's teacher**. The information that I get back on this form will become an important part of my written thesis, so getting responses is **VERY IMPORTANT!** If you have already returned your form, THANK YOU!



Still Inside...

- What to Expect from your 4th, 5th, or 6th Grade Child
- Great Math Activities for You and Your Child

What to Expect from Your Child

in terms of **MEASUREMENT**

Fourth Grade

Your child should be able to:

- Measure length to the nearest quarter inch, eighth inch, and millimeter.
- Subtract units of length that may require renaming of feet to inches or meters to centimeters.
- Know and use formulas for finding the perimeter and area of rectangles and squares.
- Estimate and calculate the area of rectangular shapes by using appropriate units, such as square centimeter, square meter, square inch, or square yard.
- Understand that rectangles with the same area can have different perimeters and that rectangles with the same area can have different perimeters.
- Find areas of shapes by dividing them into basic shapes such as rectangles and triangles.
- Use volume and capacity as different ways of measuring the space inside a shape.
- Add time intervals involving hours and minutes.
- Determine the amount of change from a purchase.

Fifth Grade

Your child should be able to:

- Understand and apply the formulas for the area of a triangle, parallelogram, and trapezoid.
- Solve problems involving perimeter and area of rectangles to find the area of more complex shapes by dividing them into simple shapes.
- Determine the surface area and volume of rectangular solids using appropriate units.
- Understand and use the smaller and larger units for measuring weight (ounce, gram, and ton) and their relationship to pounds and kilograms.
- Compare temperatures in Celsius and Fahrenheit, knowing that the freezing point of water is 0 degrees Celsius and 32 degrees Fahrenheit and that the boiling point is 100 degrees Celsius and 212 degrees Fahrenheit.
- Add and subtract with money in decimal notation.

Sixth Grade

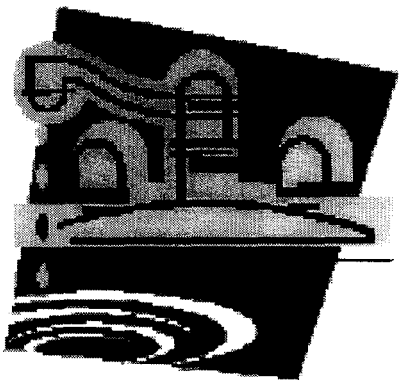
Your child should be able to:

- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
- Understand and use larger units for measuring length by comparing miles to yards and kilometers to meters.
- Understand and use larger units for measuring area by comparing acres to square miles and square kilometers to square meters.
- Understand the concept of the constant pi as the ratio of the circumference to the diameter of a circle. Develop and use the formulas for the circumference and area of a circle.
- Know common estimates of pi (3.14 or 22/7) and use these values to estimate and calculate the circumference and area of circles. Compare with actual measurements.
- Understand the concept of significant figures and round answers to an appropriate number of significant figures.
- Construct a cube and a rectangular box from 2-dimensional patterns and use these patterns to compute the surface area of these objects.
- Use strategies to find the surface area and volume of right prisms and cylinders using appropriate units.

February 2002-Issue 6 (4-6)

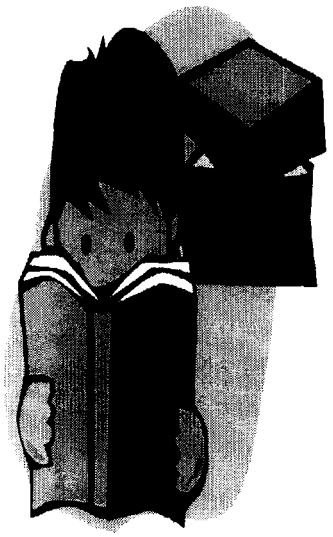
Great Math Activities

Water Wise



You will need:
- water
- measuring devices
- one week

Estimate how much water you would use if you left the water running while you were brushing your teeth each day. Find a way to measure the amount of water you do use while brushing your teeth in one week. How much water was it? In cups? In pints? In quarts? In gallons? How long would it take you to have enough water to fill a swimming pool (20,000 gallons) at the rate you use water when you brush your teeth? If you want to save water, turn off the water while you are brushing your teeth!



Story Time

Reading to your child or with your child is VERY important. Next time you are at the library, pick up a few of these books and read them with your child. They are great stories that deal with the concept of measurement.

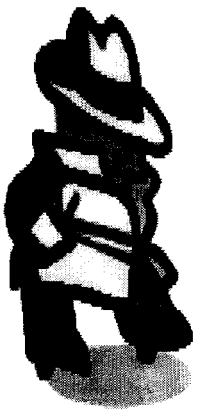
- Time for Horatio by Penelope Colville Paine
- 8,000 Stones by Diane Wolkstein
- Diary of a Church Mouse by Graham Oakley
- Around the World in Eighty Days by Jules Verne
- Metric Puzzles by Peggy Adler and Irving Adler
- The Giant Jam Sandwich by John Vernon Lord
- The Largest Dinosaurs by Seymour Simon
- The Smallest Dinosaurs by Seymour Simon

Estimation Detective

You will need:
- paper and something with which to write
- detective eyes
- creativity

With your child, brainstorm a list of different measurements. For example:
- a length of 3.5 meters
- something that weighs more than 1 kilogram but less than 2 kilograms
- a container that holds about 200 milliliters

Then, split up your list into two lists, one for each of you. Without using any measuring tools, look around for things you think might fit the description on your list. When you have both found all of the objects to complete your lists, have your child suggest ways to check to see if your objects really do complete your lists. Measure each of your objects. The person with the most correct objects wins!



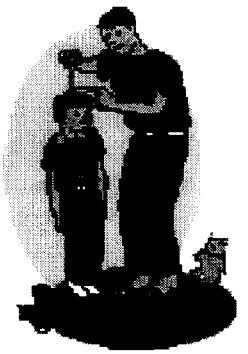
February 2002-Issue 6 (4-6)

Great Math Activities

Human Measures

In 1958, a group of students at MIT thought it would be interesting to use the human body as a measuring instrument. They measured a nearby bridge using one of their classmates. Their measure, Smoot, was 5 feet 7 inches tall. They found that the bridge measured 364.4 Smoots plus one ear.

In the same fashion, use your body to measure. Take a piece of yarn and cut it to the length of your arm from elbow to the end of your middle finger. Make one for your child as well. Measure items around your house with these "rulers". Compare your measurements with your child's measurements of the same objects. Talk about why we use rulers now instead of using our bodies.



Lid Ratios

You will need:

- several circular lids
- ribbon, string, or yarn
- scissors
- paper and pen or pencil
- tape

First, pick out a lid to measure. Cut a ribbon or string that measures AROUND the lid exactly. This is the circumference. Now cut a string that measures across the center of the lid. This is the diameter. Tape the strings to a piece of paper. Repeat with several more lids. Now look at your strings. How many times longer is the circumference string than the diameter string? How many diameter strings would fit along the circumference string? This relationship between circumference and diameter is called pi.

Estimation Quickie

Select an object. It can be someone or something around your house. Any object will do. Then have your child select an aspect of the object to estimate. It can be the height, length, weight, volume, etc. Make estimates for that aspect of your object. When you have each made an estimate, measure your object and see how close you came to the actual measurement. Repeat this activity with several more objects. See how close you can get to the actual measurements.

Activities and information for this issue came from:

- Elementary and Middle School Mathematics by J. A. Van de Walle
- Curriculinks Grades 5-6 by C. Fong
- Indiana Standards 2000- Mathematics
- Math Through Children's Literature by K.L. Braddon, N.J. Hall, D. Taylor.

February 2002-Issue 6 (4-6)